THE PALESTINE EXPLORATION FUND.

Died

On the 25th December, 1890,

THE ARCHBISHOP OF YORK,

President of the Society.

THE YEAR 1890.

1. The chief event of the year has been the work of Mr. Flinders Petrie at Tell el Hesy. A firman having been granted for excavation within an area of ten kilometres at Khŭrbet 'Ajlân, Mr. Petrie went up from Egypt in February, and commenced the operations which have been so surprisingly successful. Tell el Hesy was the spot chosen for the excavations, and here the wall of the ancient Amorite city of Lachish was discovered, as well as later constructions believed to belong to the times of Rehoboam Asa, Jehoshaphat, Uzziah, Jotham, and Manasseh. The discoveries of pottery are of great importance. Mr. Petrie states that "we now know for certain the characteristics of Amorite pottery, of earlier Jewish, and of later Jewish, influenced by Greek trade."

2. Herr Schick's untiring and intelligent work at Jerusalem has produced many interesting and valuable results. He has reported further discoveries north of Damascus Gate, including a Greek inscription; several more rock-hewn chapels and rooms at Silwân; a very remarkable passage, with shafts, leading to the spring of Gibeon; further excavations on the eastern brow of Zion which revealed the existence of an extensive series of rock-cut chambers apparently designed for dwellings; a remarkable and elaborate tomb near Bethany; and excavations on Olivet, and at Siloah in connection with the (so-called) "second" aqueduct.

3. To Herr Schumacher the Fund has been indebted for notes on subjects of interests from Galilee, and for a description and photographs of the curious human figures cut in the rocks near Kâna.

4. Dr. Post of Beirût has contributed the first part of an essay on the sects and nationalities of Palestine, and Mr. Frederick J. Bliss, also o

Beirût, has furnished an elaborate report on Ma'lula and its dialect, derived from personal investigations on the spot.

5. Many minor observations and discoveries have been reported. Professor Hayter Lewis has sent a photograph of a squeeze of an Assyrian tablet found at Jerusalem; the Rev. J. E. Hanauer has described another visit to the curious cave at Sarîs; Mr. Gray Hill and Mr. W. Simpson have reported observations on a remarkable system of irrigation by underground canals, and the Rev. James Neil has communicated a paper on the same subject in connection with the pits at Nimrin; Dr. Selah Merrill has supplied an account of "birds and animals new to Palestine"; and Dr. Chaplin has reported the discovery of an inscribed Hebrew weight, believed to belong to the period of 800 B.C., and of a stone mask from Er Râm.

6. Apart from actual discoveries, valuable literary contributions to the *Quarterly Statement* have been made by Major Conder, R.E., the Lord Bishop of Salisbury, the Rev. W. F. Birch, the Rev. H. Brass, the Rev. J. H. Cardew, Mr. George St. Clair, Mrs. Finn, and others.

7. A manuscript of a journey to Tadmor in 1691 having been placed in the hands of the Executive Committee, they thought it well to print it. It contains copies of many inscriptions in Greek and in the Palmyrene character.

8. The publication of the meteorological observations taken under the auspices of the Fund at Sarona and Jerusalem, has been continued by Mr. James Glaisher, the indefatigable Chairman of the Fund.

9. The new publications of the year (besides the *Quarterly Statements*,) have been—

"Palestine Under the Moslems," by Guy le Strange.
"Ajlûn Within the Decapolis," by G. Schumacher.
The New Map of Palestine.

NOTES AND NEWS.

Everyone interested in the Archæology of Palestine will regret to learn that the famous "Siloam inscription" has been cut out of its place in the rock tunnel and carried away, It was broken in removal, and the fragments are reported to have been sold to a Greek of Jerusalem. On receiving this intelligence the Executive Committee forwarded to Hamdi Bey a resolution expressing their regret, and the hope that immediate steps will be taken to secure the fragments.

Fortunately an accurate copy of this inscription has been made and published by the Fund. The occurrence shows how valuable the work done by the Fund has been in preserving records of monuments which are in daily danger of being destroyed. The Rev. W. Ewing, of Tiberias, reports that the gateway of the small synagogue at Kefr Birim has disappeared, but that the stone bearing an inscription has been preserved.

The manufacture of "Antiques" in Palestine seems to be going on with renewed energy. Another "Siloam inscription" has been produced, and copies of it sent to several persons in England. It is a clumsy forgery in seven lines of Phœnician characters, which appear to have been transliterated from an original in square Hebrew.

Herr Schick reports a find of *shekels* at Hebron, which were purchased by a resident at Jerusalem; but adds, "a good many false ones are in circulation."

The Committee have engaged the services of Mr. Frederick Jones Bliss, B.A., son of the President of the American College, Beirût, to continue the excavations at Tell el Hesy (Lachish), begun by Mr. Flinders Petrie last spring. The Sublime Porte have renewed the Firman. Subscriptions for this object are urgently needed.

Excavations in search of water are being made in and around Jerusalem under government auspices. Herr Schick states that the people employed for this work "have a man, a Greek, who understands where water is to be found. "He puts his ear to the ground in order to hear the gurgling. First they dug "outside the Damascus Gate, then in the neighbourhood of the Tombs of the "Kings, and then at two places inside the Damascus Gate, but without success." Herr Schick's latest note on the subject will be found on page 20.

It may be well to mention that plans and photographs alluded to in the reports from Jerusalem and elsewhere cannot all be published, but all are preserved in the offices of the Fund, where they may be seen by subscribers.

An account of the excavations at Tell el Hesy (Lachish) and places visited in Palestine by Mr. Flinders Petrie will be ready in a few days. It contains 10 plates and other drawings illustrating the articles found. Price to Subscribers to the Fund, 6*s.* 6*d.*, in paper covers.

The first volume of the "Survey of Eastern Palestine," by Major Conder has been issued to subscribers. It is accompanied by a map of the portion of country surveyed, special plans, and upwards of 350 drawings of ruins, tombs, dolmens, stone circles, inscriptions, &c. The edition is limited to 500. The first 250 subscribers pay seven guineas for the three volumes; subscribers to the "Survey of Western Palestine" are privileged to have the volumes for this sum. The price will be raised, after 250 names are received, to twelve guineas. The Committee *are pledged never to let any*

copies be subscribed under the sum of seven guineas. Mr. A. P. Watt, 2, Paternoster Square, is the Sole Agent. The attention of intending subscribers is directed to the announcement after Maps and before Contents of this number.

Mr. H. Chichester Hart's "Fauna and Flora of Sinai, Petra, and the Wâdy 'Arabah" is almost ready, and will be sent out to subscribers in a few days. All the Illustrations for M. Ganneau's volume are ready, and it is hoped they will be issued with the letterpress before the end of the year.

The following gentlemen have kindly consented to act as Honorary Local Secretaries:

Rev. John Howell, for Mountain Ash.
W. E. S. McGregor, for India.
Rev. J. L. Thomas, M.A., for Briton Ferry.
Joseph Hall, Esq., for Swansea.
Rev. J. H. Skewes, for Liverpool.
J. B. Davies, Esq., Hafod y Coed, for Llanfairfechan.
Rev. W. Vaughan Jones, for Wrexham.

The Committee have to acknowledge with thanks the following donations to the Library of the Fund, viz.:—

From Capt. Hankey, R.N., "The Antiquities of Palmyra," (1696).
From the Author, "Wine and Oil from Emmanuels Land," by Rev. James Ormiston.
From the Author, "With the Beduins," by Gray Hill.

The Committee have added to their list of publications the new edition of the "History of Jerusalem," by Walter Besant and E. H. Palmer (Bentley & Son). It can be obtained by subscribers, carriage paid, for 5*s.* 6*d.*, by application to the Head Office only. The "History of Jerusalem," which was originally published in 1871, and has long been completely out of print, covers a period and is compiled from materials not included in any other work, though some of the contents have been plundered by later works on the same subject. It begins with the siege by Titus and continues to the fourteenth century, including the Early Christian period, the Moslem invasion, the Mediæval pilgrims, the Mohammedan pilgrims, the Crusades, the Latin Kingdom, the victorious career of Saladin, the Crusade of Children, and many other little-known episodes in the history of the city and the country.

The books now contained in the Society's publications comprise an amount of information on Palestine, and on the researches conducted in the country, which can be found in no other publications. It must never be forgotten that no single traveller, however well equipped by previous knowledge, can compete

with a scientific body of explorers, instructed in the periods required, and provided with all the instruments necessary for carrying out their work. The books are the following (*the whole set can be obtained by application to Mr. George Armstrong, for £2, carriage paid to any part in the United Kingdom only*) :—

By Major Conder, R.E.—

(1) "Tent Work in Palestine."—A popular account of the Survey of Western Palestine, freely illustrated by drawings made by the author himself. This is not a dry record of the sepulchres, or a descriptive catalogue of ruins, springs, and valleys, but a continuous narrative full of observations upon the manners and customs of the people, the Biblical associations of the sites, the Holy City and its memories, and is based upon a six years' experience in the country itself. No other modern traveller has enjoyed the same advantages as Major Conder, or has used his opportunities to better purpose.

(2) "Heth and Moab."—Under this title Major Conder provides a narrative, as bright and as full of interest as "Tent Work," of the expedition for the *Survey of Eastern Palestine*. How the party began by a flying visit to North Syria, in order to discover the Holy City—Kadesh—of the children of Heth ; how they fared across the Jordan, and what discoveries they made there, will be found in this volume.

(3) Major Conder's "Syrian Stone Lore."—This volume, the least known of Major Conder's works, is, perhaps, the most valuable. It attempts a task never before approached—the reconstruction of Palestine from its monuments. It shows what we should know of Syria if there were no Bible, and it illustrates the Bible from the monuments.

(4) Major Conder's "Altaic Inscriptions."—This book is an attempt to read the Hittite Inscriptions. The author has seen no reason to change his views since the publication of the work.

(5) Professor Hull's "Mount Seir."—This is a popular account of the Geological Expedition conducted by Professor Hull for the Committee of the Palestine Fund. The part which deals with the Valley of Arabah will be found entirely new and interesting.

(6) Herr Schumacher's "Across the Jordan."

(7) Herr Schumacher's "Jaulân."—These two books must be taken in continuation of Major Conder's works issued as instalments of the unpublished "Survey of Eastern Palestine." They are full of drawings, sketches, and plans, and contain many valuable remarks upon manners and customs.

(8) "The Memoirs of Twenty-one Years' Work."—This work is a popular account of the researches conducted by the Society during the past twenty-one years of its existence. It will be found not only valuable in itself as an interesting work, but also as a book of reference, and

especially useful in order to show what has been doing, and is still doing, by this Society.

(9) Herr Schumacher's "Kh. Fahil." The ancient Pella, the first retreat of the Christians; with map and illustrations.

(10) Names and Places in the Old and New Testament and Apocrypha, with their modern identifications, with reference to Josephus, the Memoirs, and *Quarterly Statements*.

(11) Besant and Palmer's "History of Jerusalem," already described.

(12) Northern 'Ajlûn "Within the Decapolis," by Herr Schumacher.

To the above must now be added Mr. Henry A. Harper's "The Bible and Modern Discoveries," a cheap edition of which is in the press—price to the public, 7*s.* 6*d.*; to subscribers to the Fund, 5*s.* Mr. Guy le Strange's important work "Palestine under the Moslems," price to the public, 12*s.* 6*d.*; to subscribers to the Fund, 8*s.* 6*d.*; and Mr. Flinders Petrie's account of his excavations at Tell el Hesy (Lachish), price to the public 10*s.*; to subscribers to the Fund, 6*s.* 6*d.*

The work of Mr. Guy le Strange on "Palestine under the Moslems" was published in April, 1890.

For a long time it had been desired by the Committee to present to the world some of the great hoards of information about Palestine which lie buried in the Arabic texts of the Moslem geographers and travellers of the Middle Ages. Some few of the works, or parts of the works, have been already translated into Latin, French, and German. Hardly anything has been done with them in English, and no attempt has ever been made to systematise, compare, and annotate them.

This has now been done for the Society by Mr. Guy le Strange. The work is divided into chapters on Syria, Palestine, Jerusalem, and Damascus, the provincial capitals and chief towns, and the legends related by the writers consulted. These writers begin with the ninth century and continue until the fifteenth. The volume contains maps and illustrations required for the elucidation of the text.

The Committee have great confidence that this work—so novel, so useful to students of mediæval history, and to all those interested in the continuous story of the Holy Land—will meet with the success which its learned author deserves. The price to subscribers to the Fund is 8*s.* 6*d.*; to the public, 12*s.* 6*d.*

The new map of Palestine, so long in hand, is now ready. It embraces both sides of the Jordan, and extends from Baalbek in the north to Kadesh Barnea in the south. All the modern names are in black; over these are printed in red the Old Testament and Apocrypha names. The New Testament, Josephus, and Talmudic names are in blue, and the tribal possessions are tinted in colours, giving clearly all the identifications up to date. It is the most comprehensive map that has been published, and will be invaluable to universities, colleges, schools, &c.

It is published in 21 sheets, with paper cover; price to subscribers to the Fund, 24*s.*, to the public, £2. It can be had mounted on cloth, rollers, and varnished for hanging. The size is 8 feet by 6 feet. The cost of mounting will be extra (*see* Maps).

The third edition of Mr. Henry A. Harper's book, on "The Bible and Modern Discoveries," is already sold out, and a new and cheap edition will be ready in February. The work is an endeavour to present in a simple but yet connected form the Biblical results of twenty-two years' work of the Palestine Exploration Fund. The writer has also availed himself of the discoveries made by the American Expeditions and the Egyptian Exploration Fund, as well as discoveries of interest made by independent travellers. The Bible story, from the call of Abraham to the Captivity, is taken, and details given of the light thrown by modern research on the sacred annals. Eastern customs and modes of thought are explained whenever the writer thought they illustrated the text. To the Clergy and Sunday School Teachers, as well as to all those who love the Bible, the writer hopes this work will prove useful. He is personally acquainted with the land, and nearly all the places spoken of he has visited, and most of them he has moreover sketched or painted. The work is illustrated with many plates, and a map showing the route of the Israelites and the sites of the principal places mentioned in the sacred narratives. It should be noted that the book is admirably adapted for the school or village library.

Branch Associations of the Bible Society, all Sunday School unions within the Sunday School Institute, the Sunday School Union, and the Wesleyan Sunday School Institute, will please observe that by a special Resolution of the Committee they will henceforth be treated as subscribers and be allowed to purchase the books and maps (by application only to the Secretary) at reduced price.

The income of the Society, from September 22nd to December 19th inclusive, was—from annual subscriptions and donations, including Local Societies, £426 3*s.* 0*d.*; from donations for excavations, £29 12*s.* 6*d.*; from all sources, £589 19*s.* 7*d.* The expenditure during the same period was £642 11*s.* 7*d.* On December 19th, the balance in the Bank was £785 17*s.* 0*d.*

Subscribers are begged to note that the following can be had by application to the office, at 1*s.* each:—

1. Index to the *Quarterly Statement*, 1869–1880.
2. Cases for Herr Schumacher's "Jaulân."
3. Cases for the *Quarterly Statement*, in green or chocolate.
4. Cases for "Abila," "Pella," and "'Ajlûn" in one volume.

Early numbers of the *Quarterly Statement* are very rare. In order to make up complete sets, the Committee will be very glad to receive any of the following numbers :—

No. II, 1869; No. VII, 1870; No. III, 1871; January and April, 1872; January, 1883, and January, 1886.

It having again been reported to the Committee that certain book hawkers are representing themselves as agents of the Society, the Committee have to caution subscribers and the public that they have no book hawkers in their employ, and that none of their works are sold by itinerant agents.

While desiring to give every publicity to proposed identifications and other theories advanced by officers of the Fund and contributors to the pages of the *Quarterly Statement*, the Committee wish it to be distinctly understood that by publishing them in the *Quarterly Statement* they neither sanction nor adopt them.

Subscribers who do not receive the *Quarterly Statement* regularly are asked to send a note to the Secretary. Great care is taken to forward each number to all who are entitled to receive it, but changes of address and other causes give rise occasionally to omissions.

The only authorised lecturers for the Society are—

(1) The Rev. Henry Geary, Vicar of St. Thomas's, Portman Square. His lectures are on the following subjects, and all illustrated by original photographs shown as "dissolving views" :—

The Survey of Western Palestine, as illustrating Bible History.

Palestine East of the Jordan.

The Jerusalem Excavations.

A Restoration of Ancient Jerusalem.

(2) The Rev. Thomas Harrison, F.R.G.S., Member of the Society of Biblical Archæology, 38, Melrose Gardens, West Kensington Park, W. His subjects are as follows :—

(1) *Research and Discovery in the Holy Land.*
(2) *In the Track of the Israelites from Egypt to Canaan.*
(3) *Bible Scenes in the Light of Modern Science.*

(3) The Rev. Charles Chidlow, M.A., Caio Vicarage, Llandilo :—

Recent Discoveries in Bible Lands.

HERR SCHICK'S REPORTS.

I

Christian Tombs in Jerusalem.

Inside the town, east of the new gate of Jerusalem, the Franciscan Convent is again clearing a place for new buildings. On removing the earth, two large tombstones were found, of which I enclose drawings. They were not *in situ*, but lying without order in the earth or rubbish. One has a prismatic form, is 5 feet 2 inches long and 1 foot 6 inches high; on the base is a border 2 inches high, so that each of the sloping sides measures 1 foot 8 inches. On these sloping sides are crosses (one on each side) near the same end. They are not exactly of the same form, so I give the picture of both. They are in slight relief, indicating probably the order of the knight buried underneath.

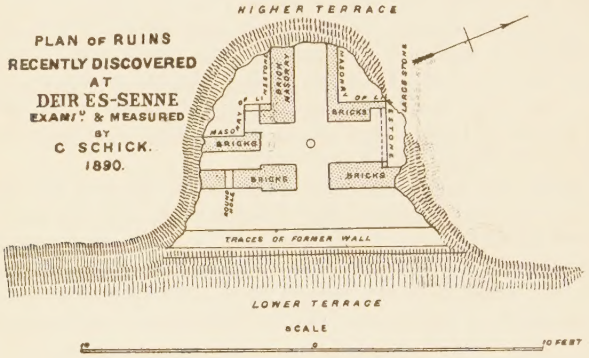
The other stone has a square or cubic form. It is 5 feet 11 inches long, 1 foot 7 inches wide, and 1 foot 2 inches high. On the top face, the edges round about have a slant of $3\frac{1}{2}$ inches. On this upper surface there is a plain cross in slight relief. I found no writing nor any other marks on these two stones, they are worked nicely, and are soft *mezzeh*. They were found south of the pieces of old wall discovered some time ago.

II

Ancient Bath and Cistern near Bethany.

A fellah of the Village of Silwân came and told me that he had made some excavations in his vineyard, and found remarkable remains of brick masonry. So I went with him, and he took me towards Bethany; but on the height between Jebel el Tur and Baten el Hawa, where the Bethany road bends eastwards, we went straight on (*see* Ordnance Survey Plan of Jerusalem, scale $\frac{1}{10000}$), and on the east slope of the Mount of Offence, downwards, for the most part, in a southerly direction, as far as the Contour 2,129, where, a little more to the south and further down, I observed a pool hewn in the rock, which is shown on the map but the word "pool" omitted. Further down, at the Contour 2,019, we came to the vineyard of the man. Near the cistern there he had his hut, lodging in it during the summer months; and on the side of it, towards a declivity, he had made some excavations in search of hewn stones, which are found everywhere about in the soil. There are on the top or brow of

the present declivity the remains of a former wall made of hewn stones; west of this an empty space or path, about 2 feet wide; and west of the latter some curious masonry made of bricks, &c., of which I enclose plan. These brick walls are 2 feet 6 inches high, the bricks are of rather small size, hard—not brittle—and without any mark. Before the bricks were used there was some masonry of hewn limestone, and everywhere the stones, which are of rather small size, were cased with bricks. This seems to indicate that the fabric was intended for fire and was probably meant for a bath—the fire to be made in the most spacious part, the fuel being put in by the door, the round hole regulating the draught. The whole was covered with flagging stones, which had become burned by the fire just as the hot Turkish baths do to-day in this country. But it puzzled me to find an indication that ever fire was used.



The brick masonry looks rather new and unused. On the north side there is a large hewn stone, no more *in situ*, but lying there where the brickwork was done, not blackened in the least. In the centre point they found a piece of a slender marble pillar, 4 inches in diameter and 1 foot long, without any base. This place and the vineyards round about is called *Deir Essenna*, which may perhaps be translated *Convent of the Year*; but this implies no meaning, so I rather think it has to be translated—the "Convent (or lodging place) of the Essenes," the Jewish sect of which Josephus speaks, "Bello," 2, 8, 2-13. My guide (the proprietor of the ground) told me there was formerly here a village, perhaps as large as Silwân at this day, but there came a plague amongst its inhabitants, so that they all died out, and this ground was then allotted to the people of Silwân. During my examinations and measurings another fellah came from the neighbouring vineyard, telling me the same thing, and stating that wherever they dig they find masonry or hewn stones. He led me a few minutes eastwards, where on the Ordnance Survey Plan stands the word "Cave," and here I found a remarkable cistern. The external opening looks like that of one of the caves of which there are so many in this district; but if one goes in he passes downwards from

one to another, and finally reaches a very large cistern, of which I give plan and section. It is entirely hewn into the rock, but for keeping water and holding the cement laid out round about with masonry of a few feet thick, as shown in the plan and section.

This wall casing or lining does not go up to the rock roof, but only to some height about 10 feet lower than the rock ceiling, so that a man can walk on the top of the wall round about. In the roof are two mouths cut in the rock, but on the top, covered up, and not observable in the vineyard. The size and form of the cistern is rectangular, 73 feet long, 49 feet wide. The height I could not exactly ascertain, as there is on the bottom a great accumulation of stones, earth, and dung. The cistern is very often the resort of cattle, sheep, and goat herds, and this accumulation is certainly 8 or 10 feet thick, so that the entire height would be about 55 feet, taking 45 feet of water, if restored again. In the southern wall there is a breach, by which men and animals can go down to the bottom of the cistern. In the masonry of the east and north walls are several holes broken, on a level with the present bottom of the cistern, so that one may see the rock behind. These seem to have been made and used as fire-places, as they are so blackened by smoke, and the man said : the shepherds also put sick animals there, in order that they may not be molested by the others ; even the shepherd himself does so sometimes.

This cistern is called " Boberich," which may be translated " large " or " grand." If the Essenes lived round about here they had water enough for their many washings.

III.

More Discoveries at Silwân.

When watching the excavation work at the so-called " second " aqueduct people told me there was discovered on the ground of the Russians some interesting writing, so I went there.

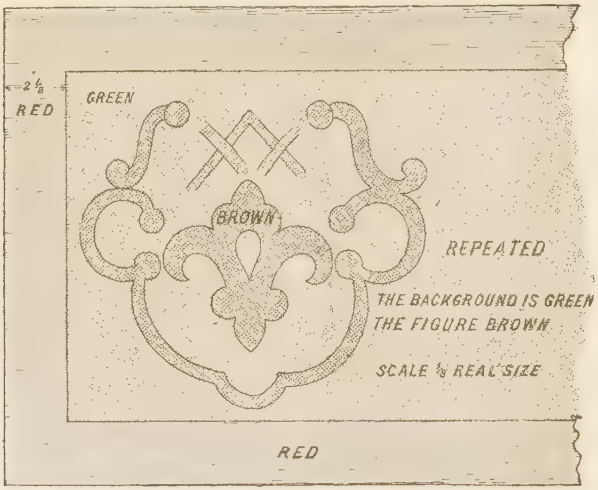
It is on the Scarped Rocks, at the north end of the village, on the spot where Sir Charles Wilson's map of Jerusalem, $\frac{1}{2500}$, mentions ancient tombs. Where the letter C stands the rock is projecting. This projecting part is of considerable height, and at the upper part a room is excavated in it, having a window on the north side. This window served also as the door, and to get up to it a ladder is required. Below, near the surface of the ground, is a passage of about a man's height, formed by two recesses, one from the east side and one from the north side, meeting inside. They are hewn in rock, only the corner being left for support. In the floor of this short passage is the mouth of a small cistern.

Opposite this rock projection, 20 feet distant, is another, not so high. The space between has a rock flooring, which apparently once formed a

room or chapel. The north wall, which was of masonry, has now disappeared; the three other sides are rock scarps, in which are small holes, for the poles of the roofing. In the south-eastern corner there still stands a piece of masonry, which once supported the roof.

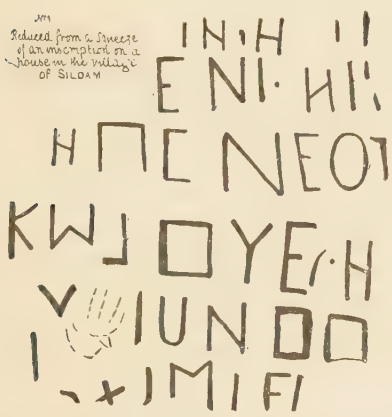
Some months ago the ground in front of this rock was bought by the Russian Archimandrite, who erected a boundary wall, and then made some excavations, especially between the two projecting parts. On the east wall of the room or chapel described three recesses were found. One is small and of no importance; another, which is opposite, is a semi-circular excavation in the rock, like a Moslem "Mihrab," and the one in the middle is square in form, 2 feet 8 inches high, 1 foot 3 inches wide, and about 10 inches deep. At the middle of the height are grooves on each side, as if for a shelf. This wall had been painted over in "fresco." Between the centre recess and the semi-circular one the painting represents a square frame in deep red, the space enclosed is dark blue, and on it are seven lines of fine writing, done in white paint. The lines are not in a horizontal but a vertical position, the greater part no longer legible, but some are still clear, and of these I made a copy, which I now forward. The letters resemble Hebrew, although the whole arrangement seems to be Christian.

South of the centre recess, and in the same line with the inscription frame, that frame is continued. It is red, and on the enclosed surface, which is green, figures are painted in brown, one of which I copied. I could not find any cross here, but high up on the rock,



on the west side of the above-mentioned window or door, a plain cross of two strokes, without any ornamentation, about 8 inches high, is hewn into the rock. I could find no opening of a tomb, but there may be such in the middle of the flooring where a heap of earth is lying.

2. When leaving this place I was taken to a house in the upper part of the village, and shown an inscription engraved slightly in the stone on the side of a window. They had before brought me a squeeze of this, very imperfectly done, as it seemed to me, and I now compared the squeeze with the stone, going on letter by letter, and made it distinct and corrected it with a brush in black water-paint. It was too high to make a better squeeze, as I had no ladder, and there was nobody on the spot. Also I supposed it probable that Monsieur Ganneau may have long ago copied the inscription, and that hence it is not necessary to take much pains about it. However, I enclose here the squeeze-copy, such as it is, and hope it will be good enough for judging whether Mons. Ganneau has copied it already or not, and also whether it is of any value or not. To me it seemed to have been once a tombstone.[1]



IV.

The "Second" Siloah Aqueduct.

September 29th, 1890. In April and May last, I made three shafts in search of the second aqueduct with comparatively negative results, which I fully reported in the first week of June (*see Quarterly Statement*, 1890, p. 257). Since then I have made three more shafts with better results.

In order to go on more safely, I first opened again the shaft C, which was made four years ago (*see Quarterly Statement*, 1886, p. 197). This shaft was then marked "C." In the accompanying plan and section I now mark it "4," as it is the fourth made this year.

When coming down again to the rock-cut aqueduct (the "second"), my intention was to clear it out northwards (towards the Virgin's Spring) and follow wherever it may go. As it had no covering stones the earth was so hard that the workmen could clear it out without frames. When it was cleared for a length of 23 feet it became difficult to go on further, and so I made another shaft (the fifth) marked 5 on the plan, and on

[1] This appears to be the writing I described in 1872 which is written in vertical lines and seems to be 6th century Syriac.—C. R. C.

coming down into the rock-cut channel it was found that there was a door, and that the channel was covered with rock, *i.e.*, from this point it was seen to be a rock-cut tunnel 6½ feet high (in parts even more), at the bottom only from 8 inches to 15 inches wide, at or near the top always about 2 feet wide, in several parts more, so that the sides are slanting. The direction is rather in a crooked line, as the adjoining plan will show.

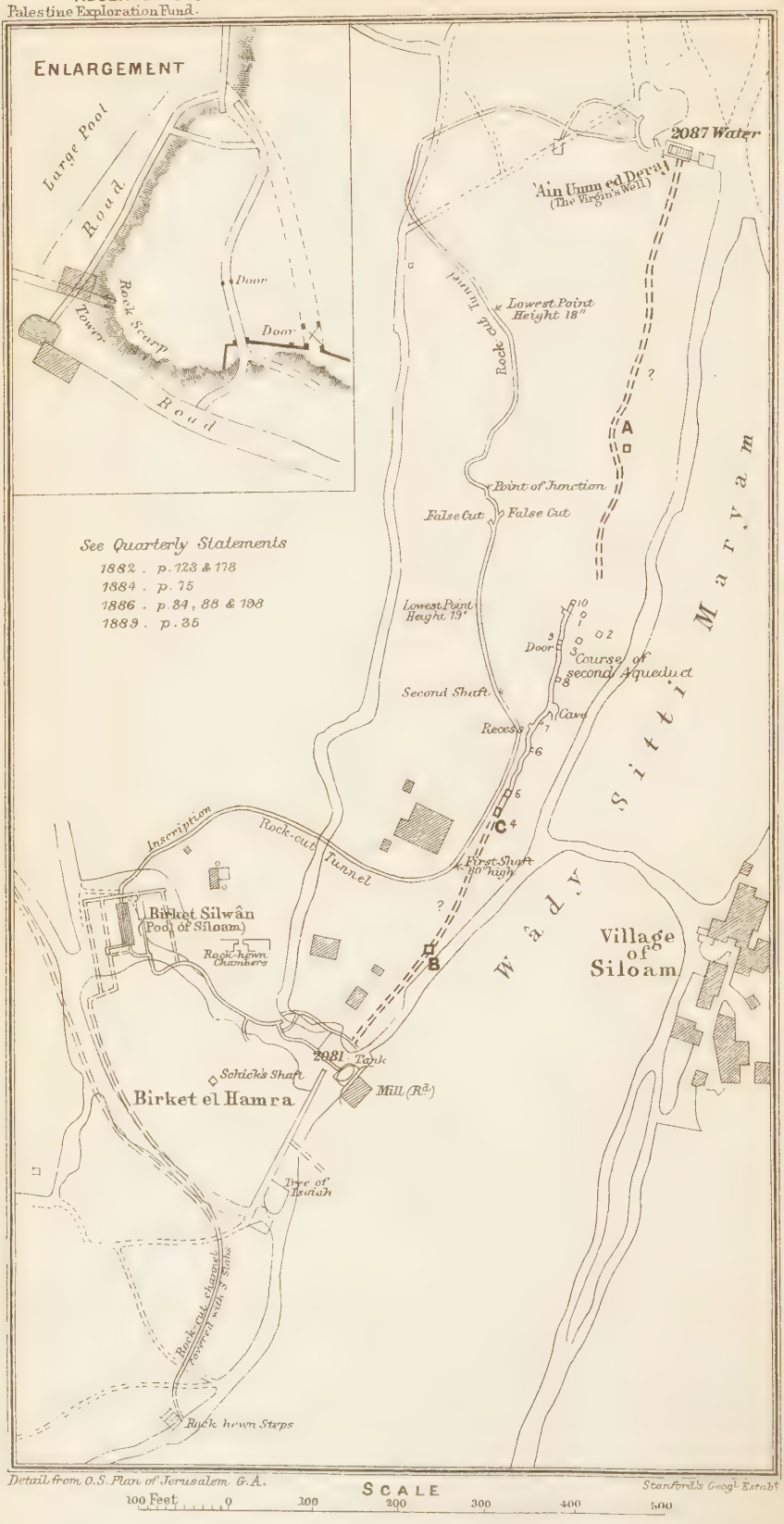
When cleared out for 17 feet a rock ledge was met, 2 feet high and 7 inches thick, standing across the channel, in order, apparently, to enable the water to be stored when necessary. There is a round hole in the ledge near the bottom, and when this was opened the water would run out. A few feet further north there is, on the east side, a door-like opening, and rock-cut steps lead down to the channel, or the water. About 20 feet further north is a similar door and steps, also on the eastern side. As it was difficult to go further on with the clearing, we opened another shaft over these last steps, marked in plan "6" (being the sixth). As according to the drawing in Sir Charles Wilson's plan of Jerusalem ($\frac{1}{2500}$), the present aqueduct (now in use) must be very near to this "second" one.

I hoped we might come to it, *i.e.*, to a masonry wall, which, when broken through, would bring us to the present aqueduct, and my original idea was that this "second" one is simply the original continuation of the real one, the lower part of which latter was afterwards hewn westward through the mountains, and this lower piece abandoned. But it is now clear that this was not the case. The level of the "second" is already here a few feet higher than the other; and having passed the "bend" without meeting the aqueduct, and still going northward, it is evident that the "second" is entirely another one! About 25 feet from the last steps there appears to be a door in the western side, and over it a kind of shaft, shut up with a large stone. The rock having here also some clefts, we intended to make a shaft here, but as I had no time for fixing the exact site over it, the workpeople went farther on, and thus found the passage shut up by a wall, consisting of square hewn stones laid dry, without mortar, so that this being removed it was found that here also the passage has a door, behind which (north) the rock roofing had an end. So I resolved to make here a shaft, being already in the ground of the the neighbour who does not make so much difficulty as the proprietor of the ground in which we made the shafts 4, 5, 6. By guidance of the bearings with the compass in the passage, and then on the surface, I fixed the point, and people are now digging the shaft. Of the further results I will report in due time.

At shaft 6, over the lower steps, there is laid a very large covering stone on the rock shoulders, as shown in the section. It is most remarkable that two aqueducts were made so near to one another, running parallel, and at no great difference of levels. Both cannot have been made at one and the same time, and the question may be asked which is the older one? To me it seems the so-called "second" one is the oldest, which brought the water only to the lower or large pool, the present

PLAN OF THE AQUEDUCTS AND CONNECTIONS RECENTLY DISCOVERED AND SUPPOSED CONTINUATION OF COURSE.

Palestine Exploration Fund.



Detail from O.S. Plan of Jerusalem. G.A.

SCALE

100 Feet 0 100 200 300 400 500

Stanford's Geogl Estabt

"Birket Hamra"—"Old Pool" on Sir Charles Wilson's map. It is remarkable that the present one comes so much eastward out from the mountains, running parallel with the "second" in this region and then going again westwards through the mountain. What may have been the reason? These (seemingly) unnecessary bendings made the aqueduct 225 feet longer, and hence caused much more labour and expense, so it must have had a reason. Further, the decline of the "second" one is rather large, whereas the present one is nearly level, with a very slight descent, so that if the decline should be found further on, as it has been found in the part already excavated, it will come out only a few feet below the present surface, round the entrance to the Virgin's Spring, at a level of about 2,116, whereas the bed of the spring is 29 feet below.[1]

From the translation of the inscription found near its lower end it is always believed that two parties of workmen have done the present aqueduct, beginning at the same time at both ends, and meeting in the middle. If this was so, then during that time the water must have had another outflow, and been brought up probably by wallings to a higher level, for running off; otherwise the water would have followed the workpeople and drowned them.

I may also notice that the part of this "second" aqueduct, now excavated, is very similar to that near Bir Eyûb, excavated by Sir Charles Warren.

On the levels mentioned in this report, and entered in the adjoining plan and section, I have to remark that only to a certain degree can they be depended upon, as at my levellings I had not a fixed and sure starting-point. I wished to take the bench-mark on one of the lowest houses in the village of Silwân as the starting-point, but unhappily this bench-mark is no longer visible, as the wall of a new house has been built in front of it.

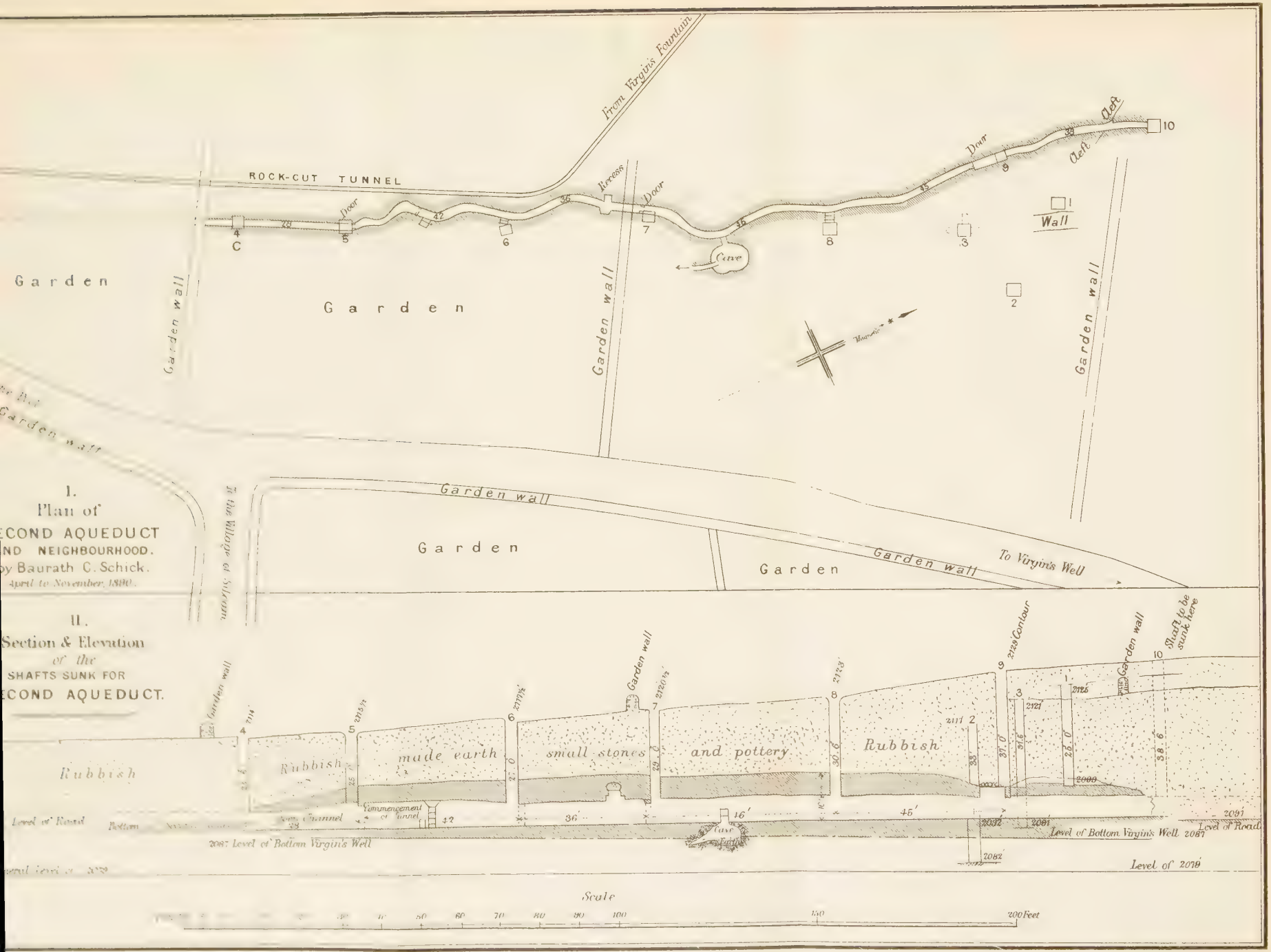
So, as I did not know the level of the bench-mark, I took as a starting-point the inserted level, 2,078, in the road going over from the aqueduct side to the village. But always in winter the surface, even in the street or road, becomes altered by the heavy rains, so my starting-point with the level, 2,079, is only approximate. I think in future to take the bed of the Virgin's Spring as the starting-point, and, if necessary, correct the others accordingly. Finally, I have to remark that the part of the present or "famous" aqueduct, running parallel with the part of the "second" now excavated, is given in Lieutenant Conder's drawing quite straight, as I have entered it in my plan; but in Sir Charles Warren's Map of Jerusalem the lines form a slight bow, as I have shown by dotted lines in my plan. It is now quite clear that the water of the

[1] This aqueduct appears already to have been traced to a level which precludes the idea that it came from the Virgin's Spring. I expect it was connected with the surface channels on Ophel which I described in 1872, but which were afterwards quarried away. Possibly it was a drain. It is, however, interesting to follow out. I see no reason why it should be older than the Siloam aqueduct to the Virgin's Pool.—C. R. C.

spring came out originally on a higher level, so that the "second' aqueduct could carry it off, and that when the present aqueduct was made it was found necessary, in order that it might be hidden, to lay it lower, and hence the necessity for a new canal. But the whole was shut and filled up so that no enemy could see or find either spring or aqueduct.

November 18th, 1890.—At the end of September I reported on the excavations at the "second" Siloah aqueduct, done by order of the Committee. To-day I have the honour to report on the further progress of this work, illustrating it by the accompanying complete plan and section. The drawings sent with the first report only show the state of things so far as known at that time, and hence are incomplete. Those I send now represent the whole work done during this year, and the result thereof.

Explanation:—The shafts which were made I numbered 1 to 10 according as they were made one after the other. Nos. 1, 2, and 3 were made in April, as I fully reported at the time. Then 4, 5, and 6 were made successively, and reported in my last, with what had been found up to that time *i.e.*, that the aqueduct was already cleared to the end of the piece of ground, and shaft 7 had to be opened in order that we might be enabled to go on with the work. This shaft was made beyond the boundary wall, being already on the ground of the neighbour, who had no objection if six or eight francs backsheesh were paid for each. The shaft 7 was 29 feet deep, coming only a little on the side (as the plan shows). The aqueduct has here a kind of door, and runs more and more away from the present or acting one; so all hope that it afterwards enters it has faded. Also the door towards west, of which I spoke in my last, proved to be no arm or branch of a tunnel, but simply a recess like the one opposite. When the passage was cleared northwards for about 20 feet from the middle of the shaft on the eastern side, a hole was found, which led downwards to a sort of cave with a good deal of earth in it. It was cleared to some depth, when seeing a cleft like a channel running from it southwards (*see* drawings), we discontinued the work in it. This cave is partly natural and partly artificial. From its lower position it can never have been a tributary to the aqueduct, but rather have been a ventilator or water distributor, when there was a great stream. As the opening to it is several inches above the bottom of the aqueduct, when the stream of water was low none would go through it (*see* section). Here the aqueduct makes a bend, taking a direct northerly course, its previous direction being north-easterly. At 16 feet from the last shaft (7) another shaft or hole in the rock on the top of the aqueduct appeared, and I resolved to open it, in order that the work might go on better, as when bringing all *débris* and stones out by shaft 7 the advance was very slow. Not being quite well, I was not inclined to take the risk of going down, so my substitute took the bearing and fixed the point on the surface where the shaft had to be made. It proved afterwards to come some feet too much east, which had, however, some advantage, namely, to enable the steps



I.
Plan of
ECOND AQUEDUCT
ND NEIGHBOURHOOD.
by Baurath C. Schick.
April to November, 1890.

II.
Section & Elevation
of the
SHAFTS SUNK FOR
ECOND AQUEDUCT.

London. Stanford's Geog.l Estab.t

going down from the surface of the rock to be cleared, and anything falling down the shaft would not fall on the heads of the workers below. Also, the height of the rock could be measured; it is here $10\frac{1}{2}$ feet from the floor of the aqueduct, and up to the surface is $30\frac{1}{2}$ feet. A little north of it stands a fine pomegranate tree, and I thought the tunnel would go just under it, but it proved to be a few feet more west. A little further, and the tunnel was filled with stones rather than with earth as hitherto; sometimes large ones, so that they had to be broken in pieces before they could be brought in the baskets up through the shaft No. 8 to the surface. Thus the advance in a day was not great. At 35 feet from shaft No. 8 the tunnel became suddenly much wider, viz., 2 feet 8 inches instead of 1 foot 6 inches to 2 feet; and also much higher, namely, 7 feet instead of $5\frac{1}{2}$ or 6 feet (as the height is varying—in the so-called door only 4 feet or a little more). The top or ceiling of this wider and higher part for a distance of 6 feet was not rock, but six stones, rough and unhewn, each on an average 1 foot broad and 4 feet long, were put across. I now pointed out the place where a new shaft (No. 9) had to be made, a little more north, so that the shaft may come partly on the top of the rock, and thus the men be enabled to remove one or two of the covering stones. It turned out that when one was removed there was opening enough to go on with the work. This latter shaft is 37 feet deep; it is situated on the contour line 2,129 feet above the Mediterranean; the floor of the aqueduct is therefore 2,092 feet, or 5 feet *above* the floor of the Virgin's Well. It is clear that when this second aqueduct was abolished, the hitherto oblong or squared opening (or shaft) was shut up by putting the six stones across it, after a good many stones and earth were cast down, which we had now removed again. East of it I had opened the shafts Nos 1, 2, and 3, in April, without result.

From shaft No. 9 the aqueduct was cleared for 38 feet further north. At 27 feet the rock has a cleft on the top, and partly also on both sides (*see* plan). North of the cleft the rock is *nahry* and brittle, whereas till here it had been of a harder nature. The thickness of the covering part is here less than hitherto, and at the point mentioned, 38 feet from shaft 9 the cover having been thin, had fallen down. So another shaft can be made here. But as the days have now become short, and the rains will soon set in, I have resolved to give up the work. If it is wished to continue the work, it can any day be taken up again, as I fixed the point where the next, or shaft 10, will have to be made. It is on the ground of another man, now planted with nice cauliflowers.

As regards the sinking of the shafts, the soil was for the greater part hard-made earth, but in each were also layers of small stones and chippings, which rendered necessary some propping and scaffolding, although not regular casing. I am thankful to God to be able to say that no accident happened, either to myself, my men, or the general labourers.

The result of these excavations brings the full and unquestionable proofs that *there was in ancient time a "second" Siloah aqueduct*, of which

I laid bare, several years ago, a length of about 125 feet, and now its continuance of 245 feet. The piece between, of about 200 feet, not yet excavated, can hardly be a matter of question, as quite the half of its length is fully proved.

With regard to the level, the excavations prove that the starting point at the Virgin's Well was higher situated than now. In my former report I spoke of a calculation to come out nearly on the surface there, but as in the portions afterwards cleared out the decline is much less, and not everywhere the same, the decline is, on an average, as far as I can now reckon, only $1\frac{3}{4}$ per cent., and the aqueduct will accordingly come out at the Virgin's Well, on the flooring on which the upper stair ends, or at the foot of the upper stair, very likely where now the Moslem *Mihrab* is situated.

V.

The Height of the Siloah Aqueduct.

All explorers who have undertaken the task of going through the whole aqueduct hewn in the rock from the Virgin's Well to the Pool of Siloah say that about the middle there is a long piece very *low* –so low, that one must creep on the belly, and that if the stream should be strong, the explorer might be drowned. (*See* "Jerusalem Vol.," page 355, and elsewhere.)

From the south end northwards the height goes down from 16 to $4\frac{1}{3}$ feet in a length of 350 feet, for 450 feet further the height on an average is $3\frac{3}{4}$ feet, and there was a shaft up to the surface, now covered and unknown on the surface; from this shaft further northwards in 600 feet the canal lowers to $2\frac{1}{2}$ feet, then becoming still lower, 150 feet further it is only 1 foot 10 inches; but, adding the mud silt of 1 foot 5 inches, the whole height is 3 feet 3 inches.

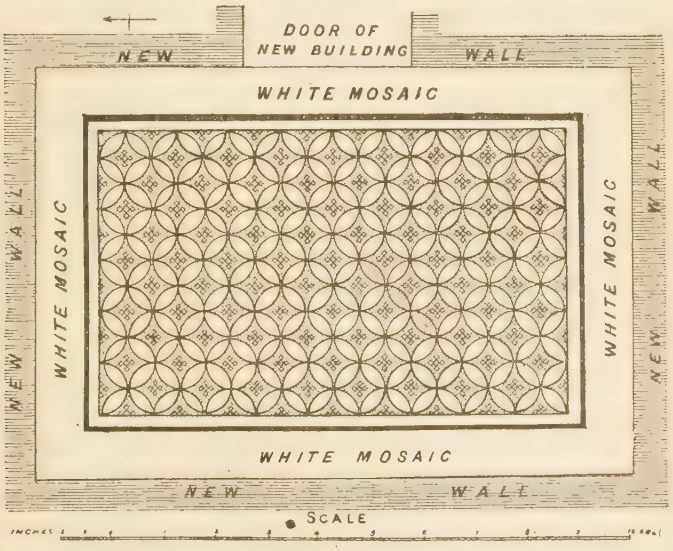
As the low part is near the surface of the brow of the hill, I had an idea that the channel might originally have been open on the top, then covered with flagging, which, having since been encrusted with lime by the water deposit, can no more be seen, but appears as rock. How could men have cut the aqueduct in a height of about 2 feet? It seems impossible, although Captain Conder (page 362) says: "the excavators were under the average size of the modern peasantry in Palestine," *i.e.*, *boys*. It is remarkable that Sir C. Warren had already spoken of some height of "mud silt," which I learned only now when reading his report, and finding in my second tunnel the floor of the channel, not level, but sometimes lower, sometimes a little higher, I thought it might be so in the other one; and as this latter is now dry I sent in my men with the necessary tools and the order to examine the floor at the place where the aqueduct is so low, and to dig down to the bottom, *i.e.*, to the *rock*; the result was—there is first some mud and a crust, and under this a deposit

of *sand*, so that the whole height is there 3 feet 8 inches, a height in which a man of ordinary stature might easily work. In the accompanying drawing I have tried to illustrate this. It is clear that originally there was water in all the depressions, that in course of time these became filled with sand and other deposit, and that what more came of such stuff was floated down to the pool, together with the water, as there was no more room for settling down, so that in course of a long time a crust was formed, over which the water ran, washing uneven particles off.

VI.

Searching for the St. Peter's (or Cock-Crow) Church on Zion.

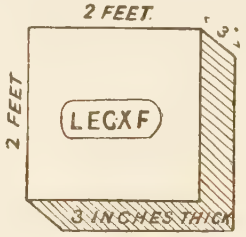
The excavating work by the Augustine Brethren went on during the summer months, but only in a small way. Walls of no special interest were laid bare, especially masonry made from *bricks*, which were apparently Roman baths. Better materials had been taken away long ago, but a *water channel* was found bringing the water downwards from a higher point, very likely from the aqueduct coming from Solomon's Pools. This channel is of poor workmanship, and not ancient. Also



MOSAIC FLOORING LAID BARE BY THE AUGUSTINE MONKS ON EAST SLOPE OF MOUNT ZION, 1890.

there was found a Mosaic flooring, perfectly preserved, of which I send the pattern. In order to preserve it, the Brethren built a room over it.

Some of the bricks, especially the larger ones, have *stamps*, of which also I give a pattern. We learn from them that these baths were made in midst of the ruins by the Roman soldiers of the 10th Legion. As such are found elsewhere also, as I have reported from time to time, it would seem that this legion was stationed for a long time in Jerusalem, and



ROMAN TILE FOUND ON EASTERN SLOPE OF MOUNT ZION.

perhaps that their tools for brickmaking may have been used afterwards by others, possibly even by the natives.

VII.

Proceedings in Searching for Water.

As all places hitherto tried had failed, they made a shaft on the north side (inside the pool) of the southern wall of the Sultan's Pool in Wady Rahab, in the valley west of the Protestant (Bishop Gobat's) School, and *found some water*, but no conduit. The water simply came out from the moist deposit there, and when they had taken out this water it ended; there was neither spring nor drainage. Some digging in the street of Deir Addas, north of the Haram Area, had the same result: no spring was found, only a very little water, coming out from an unsound cistern.

NARRATIVE OF A TRIP TO PALMYRA IN APRIL, 1890.

By Rev. George E. Post, M.A., M.D., F.L.S, Beirût, Syria.

We chose Damascus as our starting point, for several reasons—(1) its accessibility from Beirût, a matter of importance, as we had but a fortnight for the journey; (2) The ease with which we were able to get animals and supplies in that city; (3) The desire to observe the physical geography and botany of the spurs of Antilebanon, and the outlying

plains at the border of the arable land and the desert between Deir ʾAtîyeh and Qaryetein.

At 9 a.m. of Thursday, April 3, the barometers[1] read W. 27·48, B 27·63; another aneroid, with which I compared both, read 27·43. This would give the height of Damascus above the sea as 2,325 feet. The sky was at the time overcast, following a previous day of showers.

At 1 p.m. we left the city by Bab Tûma, and rode for some time along the paved Aleppo causeway, until we struck the mountain road to Ma'arrah.

Just out of the city we passed fields of Fenugreek (Arabice *Hilbah*). The seeds have a sweet, Coumarin smell, and are used to give an acceptable odour and taste to bread and biscuit. The plant is used as fodder, or to mix with other fodder to give it an appetizing smell and flavour. Cattle will often eat musty food when flavoured with Fenugreek. The milk of cows fed with it acquires a strong taste, which the natives do not dislike, but which is unpleasant to many foreigners.

The chain of Antilebanon begins at Hermon, which resembles a gigantic fin-back whale, rising over the plain of Cœle-syria. A *first chain*, composed of a table land, with few marked elevations above the general surface, extends from the shoulder of Hermon by Rasheiyah, E. by N., to the latitude of Baalbek, where it joins the main chain of Jebel-esh-Shurqi. The Wadi-el-Harîr and Wadi-el-Qarn form a pass through this chain, of which advantage was taken in constructing the Damascus Road. A *second chain* diverges somewhat more to the east, and under the name of *el-Jebel-esh-Shurqi*, trends about N.N.E. to the latitude of Ḥems Lake, where it gradually sinks to the plain at the "entering in of Hamath." The highest peaks of the Antilebanon are in this chain, overlooking the oval plain of Zebedani, which separates the two chains. The Barada, arising in this plain, flows southward, and then turning eastward, breaks through the second chain at Suq-Wadi-Barada, and continues an eastward course to Damascus. A *third chain* diverges from the Jebel-esh-Shurqi, north of el-Fiji, and trends in a N.E. direction to near the latitude of Ḥems, where it sinks into the plateau between Deir ʾAtîyeh and Qaryetein. This is the ridge, on the eastern flank of which Sîdnâyah is situated, and is known by the name of *Jebel Qalamûn*. A *fourth chain* continuous with the ridge of Jebel Qaisûn, takes a more easterly direction and then sweeps again to the north-east, and at last is merged south of Qaryetein in the range of el-Bârîdi and Jebel-ʾAin-el-Wu'ûl, which stretches away to Palmyra. In the first part of its course from Damascus to Ma'arrah, it is called *Jebel Khiṭmeh*.

[1] The aneroids used on this trip were one of Watson's and one of Browning's make. In the text *W* will signify the former and *B* the latter. Prof. Robert West, of the Syrian Protestant College has kindly calculated the heights indicated by the readings of the barometers, by comparison with those of the standard barometer of the Meteorological Department of the Observatory under his care.

These four chains have been compared to the four fingers of a left hand, spread apart, with the palm or surface directed upward. In this schematic representation, Hermon constitutes the palm; the westernmost chain corresponds to the forefinger; the main chain, or Jebel-esh-Shurqi, to the middle finger; the third, or Jebel Qalamûn, to the ring finger; and the fourth, or Jebel Khitmeh, to the little finger.

Our road from Damascus to Ma'arrah lay over the little finger of the mountain hand. On the chalky foot hills, glaring in the afternoon sunshine, we met with *Astragalus angulosus*, *Scorzonera lanata*, *Iberis odorata*, and *Androsace maxima*.

We breasted the first spur of this range in the face of a gale, which made it difficult for our animals to maintain their footing on the slippery rocks. But as we got under the lea of the ridge the wind ceased to blow in our faces, and we were able to enjoy the magnificent panorama of the Ghantah, Haurân, and Gilead, with the mountains of Galilee for a frame on the right, and Jebel-el-Bâridi in the far distance on the left. The top of Jebel Khitmeh is saw-toothed and jagged in the extreme, and a steep talus of *débris* forbids the ascent along most of its eastern flank. We wound up gradually to a break in the crest, and just before reaching it passed through a natural cleft, where we collected fine specimens of *Lloydia rubrociridis*, *Bellevalia flexuosa*, and *Ornithogalum montanum*.

As soon as we had surmounted the crest, we began to pass over the rolling table land of Ma'arrah, which lies between the little and ring-fingers of the mountain system. Just before reaching the village we passed a series of shafts, many of them not more than eighteen inches across—some of them in the very path, where an incautious man or animal might easily fall in. They lead down to the village aqueduct, which is about fifteen feet below the surface of the ground. They are used to enable a man to go down into the aqueduct and clean it out. The villagers told me that every now and then an animal, or a part of him, falls into one of these pits, and once a child fell into one, and was rescued with some difficulty. Similar shafts are found in the neighbourhood of Qaryetein and Palmyra, and will be described in their place in this narrative. This system of water supply is widely known throughout Asia, and has been treated at length by Mr. Simpson in the *Quarterly Statement* for January, 1890.

Ma'arrah is five and a-half hours, mule time, from Damascus. At 7 p.m. the barometers were W. 25·7, B. 25·85; height by W., 4,200 feet above the sea. The sky was clear, and the air bracing and cool. We obtained two good rooms in the Syrian priest's house, and after a hearty supper, were not loath to compose ourselves to rest.

Friday, April 4, *Ma'arrah.*—Barometers, 7 a.m., W. 25.7, B. 25·85, as ast evening.

The village and convent fortress of Sîdnâyah are picturesquely situated on the eastern flank of the ring-finger range. A fine view of both is obtained about twenty minutes after leaving Ma'arrah. High above Sîdnâyah, near the crest of the ridge, is the flat-topped and unpicturesque convent

of Mar Tûma. The road to Ma'lûlah lay along the base of the mountain range of Qalamûn, gradually rising all the way. Half-an-hour before arriving at Ma'lûlah, the direct road to Yebrûd, breaks through the range by a gorge, down which a rill of fresh cool water was running. In the clefts of the rocks by this rill we found *Aubrietia Libanotica*, a beautiful purple-flowered crucifer, hitherto not seen in Antilebanon. Mr. Bliss has described the Qalamûn range graphically in his article on Ma'lûlah in the *Quarterly Statement* for April, 1890. He has also given an exhaustive description of the village, its caves, inscriptions, and interesting dialect, leaving little for me to add. We found the rough ladder leading to the principal cave on the southern cliff still more ruinous than it was at the time of his visit.

At the village fountain we saw women washing. They sprinkled over the clothes a powder which we ascertained to be the *Ushnân*. It consists of the pulverised stalks and roots of *Salicornia fruticosa*, *L.*, the Soda plant, which is also called *Hashishat-el-Qali*. This plant is reduced to an ash, from which soda is extracted by lixiviation, and used in the manufacture of hard soap. Our English word *alkali* consists of the Arabic definite article *al*, and the name of this plant *Qali*. The fathers of modern chemistry Latinised *Qali* to *Kalium*, and applied it to *Potassa* instead of to *Soda*. The people of Jarrûd, in whose neighbourhood the Salicornia grows abundantly, prepare the dried plant itself as a washing powder, by pounding it in a stone mortar.

We attempted to cross the range behind the town by the cañon. I succeeded in leading my horse through the cleft, which is at places only a yard wide, and reminds one, on a small scale, of the Gorges du Trient at Vernayaz. The horse of another of us fell in the water at the throat of the pass, and had to be pulled out backward. The third could not be induced even to attempt the passage. These two were led around the pass by a circuitous path up the rocks, near the convent of Mar Taqla, and we re-united our forces at the upper end of the gorge.

Barometer at top of pass, 2 p.m., W. 26·5, which gives height, 5,500 feet. Ma'lûlah is six hours, mule time, from Ma'arrah.

Our road from Ma'lûlah to Yebrûd lay over the rolling table land at the top of the ring-finger of the mountain system. This land is bounded toward the west by the Jebel-esh-Shurqi, the middle finger of the series. Yebrûd is four hours farther on. We passed numerous wild almond trees on our way, and in a field by the roadside met with the pigmy, cream-coloured *Viola ebracteolata*, the smallest of the genus in Syria.

Just before entering Yebrûd through the pass which separates the plateau over which we had come from that of Nebk and Deir 'Atîyeh, we saw numerous rock-hewn tombs, none of them, however, of any special interest in this land of sepulchres. A copious stream of limpid, cold, mountain water arises at the gateway of the pass, and flows through the village and out among the extensive gardens to the north.

We spent the night at the hospitable home of ———. We arrived

just in time to escape a drizzling rain. There was, however, little wind. Barometer, 6.30 p.m., W. 25·35, B. 25·45.

Saturday, April 5.—6 a.m., Yebrûd. Barometer, W., 25·25, B., 25·4. Height above sea, W., 4,550 feet.

A little incident, illustrating Oriental customs, occurred in parting. M., being a stranger, felt that he had no claim for lodging and the items of commissariat which he had received, and on giving his hand to the host at parting pressed a medjeedie into his palm. The good man refused, warmly protesting in broken English that it would be a disgrace to a Syrian to receive money from a guest, and folded M.'s hand around the silver piece. M. said that it would be equally a disgrace for an American not to pay something. The host insisted, and the guest persisted in plying arguments, until the weight of proof and the subtle influence of the concealed coin gradually caused the host's hand to relax, when by a dexterous movement M. slid the coin out of his into the other's palm, and they bade good-bye to their mutual satisfaction.

On leaving Yebrûd, while still passing through the irrigated gardens, the village of en-Nebk loomed up imposingly an hour and a half to the northward. Being the last postal and telegraph station, we wished to send letters and a despatch to our friends, but we were told that, although it was already nearly 8 o'clock, the office would not be open for at least two hours.

Another hour and a half over the rolling prairie brought us to Deir-'Atîyeh, where we rested for an hour in the hospitable house of Mr. Rahîl, the teacher of the Protestant school. We availed ourselves of the interval before the arrival of our train to write a letter to be sent by the teacher to Damascus. Barometer at 10 a.m., W. 25·7; B., 25·82; Height, W., 4,000 feet.

On leaving Deir-'Atîyeh we entered the broad plain which merges on the left into the "entering in of Hamath," and on the other into the Syrian Desert. During the first hours of our way we met with large fields of *Chorispora Syriaca*, a pretty, pink-flowered crucifer, strongly resembling in general effect *Silene Atocion*, which is so abundant in the maritime plains, and the western water-shed of Lebanon and Palestine.

The range of Qalamûn, over which we had passed in coming from Ma'lûlah to Yebrûd, now bore away to the right, while the main chain of the Jebel-esh-Shurqi trended to the left, and gradually descended toward the plain of Ḥems. On a chalky hill-side we met with *Mathiola Damascena*, not heretofore seen so far north. A little further on *Iris Sari*, so common in Moab, and also found far out in the Syrian Desert. Also the white-flowered *Tulipa biflora*, then a blue-flowered variety of *Iris Palæstina*. Little by little the ground began to assume the characteristics of desert, probably more from want of cultivation than from absolute sterility. As we rode farther to the northward, the peculiar conformation of the Ḥems Plain, which gave it the name of the "entering in of Hamath," began to unfold itself. Soon we passed the northernmost

spur of Antilebanon, and began to see Lebanon and the valley of Cœle-syria. To the north of Lebanon, separated from it by a broad plain, we could see the Nusairy range, while to the north of Antilebanon, and separated from it by the plain eastward of Ḥems, loomed up the range of hills which shuts in the Orontes Valley to the east. Ḥems is situated at the junction of the four arms of a cross, formed by the continuous valley of Cœle-syria and Hamath, running south and north, and the east and west valleys, which bisects both mountain chains, crossing the other at a right angle.

At 5 p.m. we reached the Muhammedan village of el-Mahîn. Having to wait for our train before pressing on to Qaryetein, we called for some bread and lebben. The bread was dark-coloured, and by no means clean, and the lebben was full of dust and goat's hairs. Nevertheless, we ate with the keen appetites of travellers, and, at 5.30 p.m., mounted and faced eastward towards the desert. Notwithstanding the brigandish look of our hosts they refused backshish for the provisions furnished, and bade us God-speed on our way.

We had been gradually descending all the way from Yebrûd, and still our path lay downward by a gentle grade over a rolling plain to Qaryetein, three hours from el-Mahîn. We left the last ploughed fields on turning our backs on this village, and passed no more arable land or water until we reached Qaryetein. Half an hour from el-Mahîn I collected quantities of *Silene coniflora*, characterised by its pink-purple flowers and the prominent white crown at the throat of the corolla. The moon rose full over the range of mountains to our right. By its brilliant light we saw a carriage track, which we followed all the way to Qaryetein.

The streets of Qaryetein were turned into a putrid marsh by late rains. We passed through the silent town, and at 9 o'clock p.m. knocked at the outer gate of the teacher's house. There was no response, and the gate being locked, we had no resource but to wait until one of the muleteers hunted up the proprietor, and brought him from the other end of the town. When he returned, however, he gave us a most hospitable reception. His wife immediately cleared out two of the three rooms of which the house is composed, and placed them at our service The room which we occupied was large and clean, and contributed not a little to our comfort for the two nights and the day which we spent there.

Qaryetein owes its importance to the fact that it is the border town of the desert proper, and a necessary stopping place for all who go from Damascus to Palmyra. There are two sources of water in the town, one the wells which are found in the open court of each house, and the other the fountain at some distance from the walls. A supply of water for irrigation has been obtained by extensive trenches about twenty minutes east of the town, and a more meagre one at Mar Liân by similar means. The trench of Mar Liân runs back to an underground aqueduct, which is tapped every few yards by shafts similar to those noted at Ma'arrah.

Qaryetein is governed by Fayyad Agha, the chief of a family, which has ruled this district in a feudal way for many generations. He has the reputation of being an arbitrary governor. We, however, experienced nothing but politeness at his hands. He called on us, and gave us all the information we desired in regard to the desert, among other things giving us an itinerary which made it unnecessary for us to carry water, as is usual on this journey. When we returned his call he showed us a number of interesting pieces of sculpture, with Palmyrene inscriptions on them. He told us that he proposed to form a small museum of such objects. He called the Palmyrene character *Serankili*, by which he probably meant *Estrangelo*.

Sunday, *April* 6.—9 a.m. Barometer, W., 27·18, B., 27·4; height, W., 2,660, B., 2,600; mean, 2,630 feet. We held divine service in the house of Mr. Yusuf Shahîn, the teacher, and after that a clinique for the sick folk of the village who chose to come for treatment.

During our stay in Qaryetein a pretty piece of sculpture was brought to us, and offered for sale. It consisted of a slab of argillaceous limestone, 24 inches long, and 18 broad. Most of the Palmyrene busts are cut out of this stone. The accompanying sketch will give an idea of the style of the sculpture, which was far superior to any others which I saw. The drapery is graceful, the tiara and jewellery are carved with care, and the attitude is easy and natural. The face of the original must have been one of rare beauty (p. 27).

The accompanying copies of squeezes taken from the inscriptions show the kind of legend which is found on all the busts and statues of Palmyra.

On my second journey to Palmyra, in July of this year, I was fortunate enough to obtain the bust itself. There are manifest faults in the sculpture, but the general effect is pleasing.

Monday, *April* 6.—6 a.m. We started in the cool of the morning for the desert. Our road lay at first through the walled gardens, and then through open irrigated fields. In these fields I found *Astragalus conduplicatus*, *Salvia controversa*, and *S. Verbenaca*, *L. var. vernalis*; all new for this region. Twenty minutes from the town we came to the series of trenches above alluded to, about 15 feet deep, and at the bottom there was a small stream of water. The labour with which these deep trenches are excavated shows the value attached to even small quantities of water in this thirsty land.

The part of the Syrian Desert on which we were entering consists of a series of mountain chains, trending nearly east and west, and separated by broad, almost level plains. The mountain masses are composed of the Lebanon cretaceous limestone, and the plains of mud and clay, with here and there an island of sand. The whole district seems to be underlaid by a layer of asphaltic shale. The well at 'Ain-el-Bieda is strongly impregnated with sulphur. The surface spring at el-Jebâh is also sulphurous. The fountains at Palmyra are very strongly so.

The highest peaks of the mountain chains are not less than fifteen

hundred feet above the surface of the plains. The chains begin at the longitude of Qaryetein, and end at that of Palmyra. Their length is therefore about 50 miles. The southernmost is wholly denuded of trees, and, with the exception of a few scattered specimens of Rhamnus Palæstina, I found no shrubs growing in the crevices of the rocks. The plains, notwithstanding their level appearance, fall gradually to the east-

ward. By one of our barometers Palmyra is 1,300 feet and by the other 1,180 feet lower than Qaryetein. The water which falls on them, and flows into them from the adjacent mountains, sinks into their surface. Not a single torrent flows out of them, even during the heaviest rains.

The soil is a greyish marl, with occasional out-croppings of glaring white chalk. Flint chips and nodules abound in many places over its

surface. There are, however, many levels, where for miles there is not a pebble on the ground.

In comparing these plains with those of the maritime districts of Sinai and the plateau of et-Tîh, I was struck with the absence of the broad and deep torrent beds which characterise the southern deserts. While crossing the space between Palmyra and the military post of 'Ain-el-Beida, a violent thunderstorm broke over the line of our march, about an hour ahead of us. When we arrived there an hour later we found an area of ten miles square, over which we had passed dryshod two nights before, a vast morass, in the mud of which our horses' hoofs sank to the fetlock joint at every step. The Wadi-el-Bâridi, which we crossed during our first day's journey, and in which we encamped, was the deepest water-bed that we encountered. It was only a few feet below the level of the plain.

The vegetation of these plains differs widely from that of the Sinaïtic valleys and of the plateau of the Tîh. I met with only one species of *Tamarix*, *T. tetragyna*, and that, not growing as in Sinai and the Tîh to the height of a small tree, but forming little clumps of shrubs scarcely a yard high on low sandy hummocks. On similar hummocks grows also *Lycium Barbarum*, but does not rise above two or three feet. Not an *Acacia* diversifies the landscape; not a *Retem* offers even its light shade to the sunburnt traveller. Only one *Zygophyllum*, *Z. eurypterum*, reminds one of the numerous species of that genus in the southern deserts. There is not a solitary *Caper*, nor any other of the numerous shrubs and trees which give so decided and peculiar a character to the landscape of the Sinaïtic valleys and the Tîh. Only in the Wadi-el-Bâridi did I see anything approaching a tree. Near our camp in that wadi were a few stunted trees of *Pistacia mutica*, a tree which we afterwards found in great abundance in the mountains of Jebel-el-Abiad and Bil' âs. There is every reason to believe that these mountains would support forests of *Quercus coccifera*, or other of the trees that flourish in regions equally dry, but if they formerly existed they have disappeared. There is not even a tall herbaceous vegetation on the plains. The low desert grass, *Poa bulbosa* (and its congener or variety *P. Sinaïca*), forms, for miles together, almost the sole vegetation, and when it has dried up in summer, it leaves those portions of the desert dreary indeed.

At the season when we travelled there was much grass and a considerable number of flowers, some of them beautiful. *Iris Sari* is abundant on the western half of the plain, between Qaryetein and el-Beida. On the slope of Jebel-'Ain-el-Wu'ûl, I found a new variety, *var. amblyophylla*, of *Tulipa montana*. The divisions of the perianth are obovate-oblong, obtuse. A pretty *Erysimum*, with purple flowers half an inch broad, is found everywhere, appressed to the ground. It is the species named by Boissier, in his "Supplement to the Flora Orientalis," *E. Blancheanum*. It had been named by Blanche himself *E. hamosum*, on account of its hooked pods. I have seen his type specimens in his herbarium at Beirût. But I am satisfied, by an exhaustive study of the species in the Anti-

lebanon plateaus, throughout which it abounds, and in the whole desert region through which we passed, where it is one of the most characteristic plants, that it is a variety of the polymorphic *E. purpureum*. I propose for it the name *var. Blancheanum*, of the above species, in memory of the lamented M. Blanche, to whom M. Boissier dedicated the new, but indefensible species.

Among the showy flowers of the desert at this season are *Ornithogalum montanum, var. platyphyllum*, a fine species, with inch-and-a-half broad flowers. *Sisymbrium grandiflorum, Post*, is a species with orange-coloured to pale yellow flowers, as large as the common *Stock*. This plant is general through the western part of the plain. I have it also from Aintâb *Brassica deflera*, also an orange-flowered crucifer, is found sparingly in rocky places near the western limits of the plain.

Where the desert grass, *Poa bulbosa*, and *P. Sinaïca*, grows in quantity, it gives large tracts of the plain the appearance of greenness and fertility. Tufts of *Artemisia Herba-alba* cover also large tracts, and give an olive-green tint to the surface.

Characteristic of the region, although less abundant and showy, are *Alyssum aureum A. meniocoides*, *Valerianella Kotschyi*, *Malcolmia crenulata*, *M. torulosa*, *Peganum Harmala*, the latter not yet in flower when we passed. Everywhere we saw young plants of *Ferula Blanchei*, *Boiss.*, which is also met with between en-Nebk and el-Mahîn.

Of great botanical interest are certain plants with a limited range. For example, in the green meadows surrounding the wells of Abul-Fawâris, half an hour west of Palmyra, was a great abundance of *Hutchinsia petræa*, a new plant for Syria. In the swampy district, a hundred square miles of territory were covered with *Spinacia tetrandra*. In the same swamps were found *Cynomorium coccineum*, and *Phelipæa lutea*. In the middle region of glaring white clay I found the new and showy *Muscari albicaule*, Post.

It is my conviction that artesian wells would convert the whole of the plain into a fruitful field. Many portions of it need only to be ploughed and sown to produce fair harvests, even with the scanty rainfall there enjoyed.

The Fauna of the desert is limited. The fox, jackal, hyæna, hare, jerboa, and a few species of snakes and lizards, were all the animals we saw, The birds are mostly clad in sober grey, like the soil. Except vultures and hawks, and the ḥubarab, we met with no birds of any size during this journey. We afterwards found abundance of partridges and other game birds in the Bil-'âs chain.

To return to our journey. As soon as we had passed the trenches east of Qaryetein we struck at once the dry plain, and bade good-bye to cultivation until we reached the irrigated gardens and fields of Palmyra. We carried no water with us, as we were to encamp by the Arabs at el-Bâridi the first night, and at 'Ain-el-Beiḍa the second. Usually, the first night is spent at el-Qaṣr, where there is no well, and water must be carried for man and beast.

Presently, after leaving the trenches, we crossed a shallow wadi, in which a considerable stream must flow during the rains, and rode about east across the plain. In this wadi we found *Æthionema cristatum*. On the plain *Ornithogalum tenuifolium*. After a couple of hours we crossed a low ridge, and came into another broad plain between it and the main chain of Jebel-el-Bâridi. In this plain we met with a new species of *Boraginacea*, yet unnamed. We also found *Allium Rothii*, which is general throughout the desert.

At 3 p.m. we arrived at the Wadi-el-Bâridi. In numerous basins of white chalk along its bed we found water, which was drinkable, though warm. Along the sides of this wadi was a considerable number of Arab encampments, and their black tents dotted the base of the mountains of Jebel 'Ain-el-Wu'ûl for several miles to the eastward. We pitched our tents by that of Sheikh Ramadan, the chief of the Fawâ-'irah, a tribe of tributary Arabs.

As soon as our train began to unload R. and myself rode southward for an hour and a half to the mountain range. The ground became more and more broken by wadies as we approached its foot. On a rocky hillside we collected *Zygophyllum eurypteram*, a species thus far found only in the Syrian desert. Just before commencing the ascent of the mountain we passed a second encampment of the Fawâ 'irah. Our guide Khalid remained with these Arabs while we rode up the hill. Halfway up we encountered the *var. amblyophylla* of *Tulipa montana*, with a most brilliant crimson perianth. At the top, in crevices of the rocks, *Umbilicus Libanoticus*, and everywhere *Erysimum purpureum*, *var. Blancheanum*. A few bushes of *Rhamnus Palestina* were scattered over the hillside. The soil was still quite moist from the recent showers. I believe that it would ripen a crop of wheat or barley.

The part of the ridge which we ascended is 200 or 300 feet lower than the highest peaks. The barometers stood W. 26·23, B. 26·42, giving the height by W. 3,650 and B. 3,600 feet above the sea. The difference of level between our camp in the plain and the top of the ridge at the point where we took our observations was by W. 910 feet.

The view from this mountain top was very grand. Wave after wave of mountain ridges rolled away over the desert plain, which at this season still appeared green. The plain in which our camp lay is not less than 30 miles broad at its western end, and gradually narrows to the throat of the gorge at the entrance to the street of tombs at Palmyra. From our position we could make out quite clearly the castle on the hill west of Palmyra. El-Qasr loomed up in sharp outlines in the middle of the plain, two hours north of our encampment.

On the slope of this mountain, a little north of our line of ascent, is the perennial fountain of 'Ain-el-Wu'ûl. The marauding parties of Arabs avail themselves of it during the whole year.

After enjoying, as long as our time would allow, the extensive prospect and the cool breeze, we descended to the plain. While leading my horse down the steepest part of the hill, my overcoat slipped off the

saddle. I offered a reward for its return, but either the Arabs did not find it, or thought the coat worth more than the reward, and I never saw it again. Such a loss is no trifling one in a journey where there is no way of replacing the lost article. Fortunately, however, our journey was not in the season of the bitter cold winds which often sweep over these deserts, and no ill consequences followed the loss.

We galloped over the plain, and just before sunset reached our tent. The barometers read as follows :—

7 p.m., W. 27·12 ; next morning, at 6 a.m., 27·2.
B. 27·72. „ „ 27·8.
Height, W. 2,740 ; B. 2,300.

I am unable to offer an explanation of the discrepancy between the relative readings at the top and on the plain, nor in fact for the idiosyncracies of aneroids in general.

Tuesday, April 8.—At 6 a.m., we started across the plain in an oblique direction toward 'Ain-el-Beida. The roll of the plain is very gentle, and yet very decided. The soil is for the most part white, free from stones, and barren. Nevertheless, during the day we found *Zizyphora tenuior*, *Lallemantia Royleana*, *Wall* (quite new for this region), *Arnebia cornuta*, and *Muscari albicaule*, *Post*, a new species, notable for its white stems and long peduncles. Seven hours of this prairie brought us to 'Ain-el-Beida.

This military post was established by the Turkish Government a few years since for the protection of the road from Qaryetein to Palmyra, a road travelled by large caravans of merchants and travellers. The well seems ancient. It is over 80 feet in depth, and the curb and lining stones are deeply grooved by the ropes used to let down the leathern buckets. These buckets are composed of the untanned skins of cattle and goats. They are of the shape of an ordinary fleshpot, the mouth being a loop of wood or iron, around which the skin is rolled and sewed. The thong by which the bucket is held is of raw hide. The advantage of such a bucket over one of wood is made clear to anyone who watches how it sways to and fro, and strikes the uneven side of the well on its way up and down. A wooden bucket would soon be broken to pieces by such usage. The skin bucket, moreover, can be packed away in a very small space, and carried conveniently on a mule or ass. The water of this well is brackish, but seems wholesome. It is quite cool.

The building, which serves as a barracks for the small garrison of soldiers, consists of a lower storey about 50 feet square, and a single, small room upstairs. The gateway is on the south side, opposite the well. There open into the central court, several vaulted chambers, which are used as stables and storerooms. A rude stairway leads to the roof. Over the doorway is the small upper room above-mentioned. It is occupied by the soldiers as a sleeping room, and a watch-tower from which to observe the adjacent desert. There is a wall breast high around the roof, loopholed for musketry.

The five men of the garrison, by virtue of the authority which they represent, rather than the impregnability of their position, constitute a guard sufficiently strong to overawe the hordes which occasionally sweep through this plain on their lawless raids. I took down their names; they are as follows: 'Abd-el-'Assâf (Servant of the Autocrat); Ḥamod-es-Ṣâliḥ (Praise of the Righteous One); 'Abd-el-Aghla (Servant of the Most Precious); Ṣâliḥ-el-'Ali (Righteous of the Lofty); 'Abd-Maḥmûd (Commended Servant). One of these was a negro, but there seemed to be no race prejudice among them. Another was a Bedawi, and from him I obtained much valuable information, which I hope to lay before the readers of the *Quarterly* hereafter.

At Qaryetein we had made the acquaintance of an assistant of the Attorney-General of Bagdad, who had been in Damascus, and was travelling overland to Bagdad in a palanquin, borne by two mules. It was so arranged that he could lie stretched out at full length on the bed, or sit up and look out of the windows on all sides. It was painted with scarlet, and formed a very conspicuous object in passing along the plain. This official had started at the same time as ourselves from Qaryetein, but had gone by way of el-Qasr, where he rested during the afternoon and evening hours, and then came on by night to el-Beida. This mode of travelling is adopted for the double purpose of safety from the Bedawin and escape from the fervid heat of the day. We found him at the station on our arrival at 1 p.m. We arranged to join forces at sunset, and make a night march to Palmyra. Our two caravans made the imposing array of sixteen animals and fourteen men. To encourage our muleteers and attendants to undertake this night march we gave them a bowl of strong tea all around, and promised them a lamb the next day at Palmyra. Accordingly, after resting through the afternoon, we formed in close order of march, and started at dusk. As yet the moon had not risen, and even the stars were obscured by clouds. Our only guide was the dark outlines of the converging ranges of mountains to the right and left. Palmyra lies at their meeting point. By keeping our faces toward the castle, which looms up over the Palmyra notch, we were able to hold our way over the level plain. Not infrequently our horses recoiled from the edge of some little pool of water, often not over a yard broad, and a few inches deep, which had been left by some recent shower. On our return over the same route by day, we saw many such pools, and large districts wholly under water, but a few inches however in depth.

As we approached the throat of the valley of tombs the tall towers of the dead loomed up on either side of the way. The moon, which had risen at half-past eight o'clock, now guided us over the rocky road, and caused the sepulchral monuments to stand out in bold relief. Presently we turned a corner in the path, and the wonderful panorama of Palmyra unrolled itself before us in the misty moonlight. It was one o'clock in the morning when we reached the street of columns. Silently as we had ridden in, the Sheikh was soon with us, and invited us to lodge with him. We preferred our freedom, and pitched our tent just within the

eastern gateway of the street of columns, and by half-past two we were sound asleep.

Wednesday, April 9, Palmyra.—Barometer, 7 a.m., W. 28·2 B. 28·6 giving the height by W. 1,680, and by B. 1,300 feet above the sea. The morning was bright, and our first thought was naturally the survey of the ruins. Although less massive than those of Baalbek, the general effect is more striking and impressive. No street of columns like this exists elsewhere, not even in Gerash, and the effect when the row was unbroken, and the monumental building at the western end was perfect, must have been extremely imposing, from whatever point seen. Not less so was the grand Temple of the Sun, which for general impression well rivals that of Baalbek.

The most striking view of the ruins is that obtained from the castle on the hill west of the city. The castle itself is a most picturesque ruin, and is visible to a distance of twelve to fifteen hours on the western plain, and as far as the eye can reach on the eastern. The ascent to the castle is from the south, along the old road. A horse can easily go up from this side.

In the foreground of the view from the castle is a line of pits, from which have been dug out many sculptures and other antiques. Beyond these are the remains of the several buildings, with well-preserved pillars, then the great double row of columns, beginning with the edifice usually considered as a tomb, and ending at the beautiful gateway where our tent was pitched. Branching from the main street near its centre is the side street of columns, the so-called market-place. Beyond the street of columns is the majestic Temple of the Sun, and far away behind it the glittering waters of the Sebkha (the salt lake of Palmyra), and behind that the boundless plain of the Syrian desert.

On either side of the street of columns are the ruins of the numerous temples and mausoleums of the city. Around the whole may be traced the remains of the wall of Justinian. To the southward, along the flanks of the hills, and in the valley of tombs are the sepulchral towers, which are so peculiar in this land of wonders. No ruined city in Syria and Palestine, except Jerusalem, has such a point of view from which to take in a complete idea of its grandeur.

The immediate site of Palmyra is sandy. Many of the fallen columns are embedded in white sand, and the Flora of the ruins takes its character from this circumstance. I collected among the fallen columns *Leptaleum filifolium, Silene coniflora, Holosteum umbellatum, Spergularia diandra, Malva parviflora, Erodium laciniatum, E. glaucophyllum, Medicago tribuloides Trigonella azurea, T. filipes, T. Arabica, Astragalus cruciatus, var. brachylobus, Post* (a variety with tubercled hairs on the short pods), *A. callichroüs, A. Forskahlei, Aizoon Hispanicum, Matricara aurea, Carduus pycnocephalus, Kœlpinia linearis, Statice spicata, Anchusa Milleri (?), Lithospernum tenuiflorum, L. arvense, Linaria Ascalonica, var brachyloba, Post L. albifrons, Plantago albicans, Muscari racemosum, Belle voliaflexuosa, Gasea foliosa, Vulpia pectinella, Scleropoa Memphitica, Nardurus tenuiflorus, Bromus Matritensis, Aegilops crassa.*

At an early hour in the morning Sheikh Asaad came to pay us a visit, and bring me a lamb as a thankoffering. Eleven years ago he was shot by a Palmyrene, during an armed contest over the election of the present Sheikh of Palmyra, Mohammed Abdallah. The ball passed through the pleura and injured one of his ribs. When he arrived at the Johanniter Hospital at Beirût he was in a pitiable condition. A native quack had introduced into the wound bits of rags as tents for drainage. These had slipped one by one into the chest, and, by their increasing fetor, had brought about an irritative cough and fever, which had nearly worn out his strength. When the wound was laid open to remove these, the fissure between the lobes of the lung could be seen back to the roots of the lung, and the mechanism of expansion and contraction of the organ clearly made out. He was entirely cured at the hospital, and returned with a profound sense of gratitude to the friends whom he had found so far away. He showed his gratitude, not only by bringing the lamb, but by remaining as a guard of honour at our tent during our stay, and by giving us much information about the people and the homeward route.

In the afternoon I took a comprehensive ride about the city, outside the cultivated fields. Beside gaining many interesting views of the city, I found at the edge of the wheatfields. *Malcolmia Bungei, var. glabrescens* (new for Syria), *M. Africana, var. squarrosa, Cleome glaucescens, Helianthemum Niloticum, Silene Olivieri, Onobrychis Olivieri, Asperugo procumbens, Veronica triphyllos, Lolidrion montanum, Muscari racemosum, Bellevalia flexuosa.*

The fields and orchards are irrigated by water from four different aqueducts. The largest stream is that flowing from the great fountain, south-west of the ruins. The next is that which runs along the south wall of Justinian, and turns northward near the bend in the street of columns, and runs beyond the northern limits of the ruins. At two points on this aqueduct the owners have constructed staircases leading down to the water for the convenience of the villagers, who draw most of their water supply from this source. The owners, the Sheikhs Mohammed Abdallah, Abdallah Salim, and As'ad el-Faris, bought this aqueduct of the government for fifty Turkish lirvas, and cleaned it out at an expense of two hundred more. Until this was done, two years since, all the village supply of water was drawn from the great aqueduct, outside the walls. It is interesting to watch the erect carriage of the women as they walk along, spinning or swinging their arms, and often turning their necks and heads as they chat with one another, while they carry a jar with sixty pounds of water on their heads, never so much as touching it with a finger, however violent the wind may be. I asked one of the Arabs how they learned to do this. He replied that it is a matter of coquetry with them to carry a jar gracefully, and that they practise with much care from childhood to acquire a knack which commends them to the favourable notice of admirers of the other sex.

There are two other canals which have been cleaned out, and supply water for irrigation. The Sheikh of the village assured me that there

were several more to the north of these. They are all ancient conduits, and indicate a copious water supply for the city. Sheikh Mohammed assured me that the wells of Abul-Fawâris, half an hour west of the city, are also on the line of another aqueduct, large sections of which are to be seen along the valley of tombs.

To regulate the apportionment of water, a man stands at one of the street crossings in the Temple of the Sun, with an hour-glass in his hand, and takes the time allotted to each proprietor along the line of the public canal. The tidings of the expiration of the time are communicated by a call from the roofs of the houses.

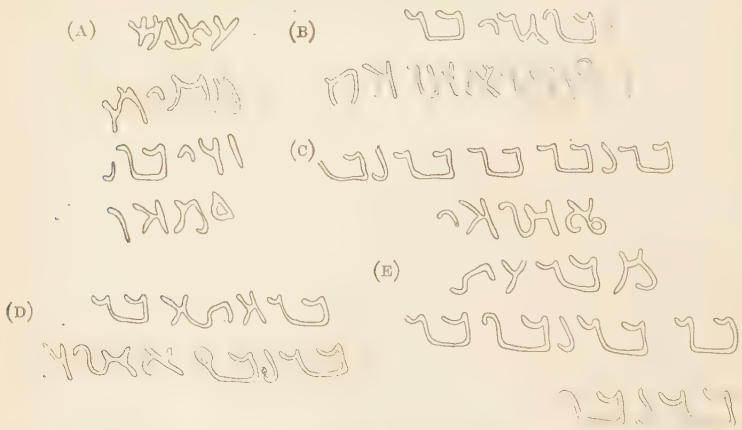
The large canal, which is public property, is open from the point of its emergence from the natural tunnel out of which it flows. The others are covered, and lie at a depth of from ten to twenty feet below the surface.

During the day we bathed in the great spring. It was a strange sensation to swim away into the darkness and find the water growing deeper and deeper the farther we penetrated, until it was far above our heads. We did not dare to swim very far into the heart of the mountain, lest the sulphurous vapours might cause asphyxia when beyond the reach of help.

A horde of people pressed about us with copper coins, mostly of the Turkish and Cufic mintings, with a few of Greek and Roman date. All

were in the state of defacement so often noted in Palmyrene coins, attributable to the sulphurous emanations from the soil. They also brought us a few clay scarabei and seals, and many squares of clay, about the size of one and two drachm weights. These are supposed to have been used as money. The impressions taken from two varieties may serve as

illustrations of the smaller kinds. One of a larger size and different shape was brought to me. An imperfect scarabæus, apparently Assyrian, was also brought. It has a winged lion with a female head.



The Mudir has a small collection of busts of rather inferior workmanship. He had, however, a large stone in front of the school-house, which he ordered to be turned face upward for our benefit (p. 35). It seems to be the father and mother of a family of three children. I took squeezes of the inscriptions, which are between the heads of the figures, copies of which are given above. The photograph was

obtained at a subsequent visit. The stone is about 5 feet long by 3 broad. The mother is represented smaller than the boys, following the conventional ideas of Oriental artists.

I secured a head in a sufficiently good state of preservation to show the headdress and coiffure, and the Palmyrene type of features, as also the

earrings and necklace, as seen in the accompanying cut taken from a photograph.

I also sketched a male bust, which gives the characteristic cut of the hair, and the arrangement of the drapery, as found in all the male

figures I saw. The characters of the inscription differ by their simplicity from those of the other tablets.

The workmanship is coarse, and the stone soft, and unsuitable for statuary. The greatest misfortune of Palmyrene architecture and art was the want of a suitable stone, in which to express the ideas of their time. The building stone is a limestone, full of veins and cleavages, so that it was almost impossible to carve a perfect Corinthian capital out of it, and the influence of the wind and sun and rain is seen in the defacement and almost destruction of a large number of elaborate details, which were undertaken in spite of the discouraging material. The statuary is chiselled out of a soft argillaceous limestone, easily cut, but as easily defaced, and incapable, like marble, of taking the finer expression which Greek and Italian marbles are so well adapted to receive and retain.

In the middle of the afternoon the clouds rolled up heavily from the west, and a few drops of rain fell. It, however, cleared up enough to enable me to complete my study of the environs of the city. At night we piled our collections in the middle of the tent, and covered them with all our available sacks and the tent carpet. It was well that we did so, as we had a series of smart showers in the night, and the rain sifted in more or less through the tent. None of our plants were injured, thanks to the precautions taken.

The chains of Jebel 'Ain-el-Wu'ûl, and Jebel-'Antar, and the other mountain ranges parallel to them, or forming angles with them, terminate, at the longitude of Palmyra, in a somewhat continuous chain, trending somewhat east of north. From the foot of this chain the great plain of the Euphrates stretches away to the east, with scarcely a knoll to break the vast expanse. An hour's distance from Palmyra is the *Sebkha*, which we explored during our subsequent visit. At the time of the present visit it was a lake several miles in length and breadth.

Thursday, April 10, *Palmyra.*—After a rainy night, the clouds rolled off, and the sun came out at about 10 a.m., with promise of a fair day. We immediately broke camp and started on our westward journey at 11 a.m. We took in the picturesque Turkish castle on the hill, and the tombs in the valley on our way. The view from the edge of the moat over the city is very fine. Doubtless that from the top of the castle is finer, but we did not think it worth the trouble of clambering up the rocks to the foot of the wall to obtain it.

After lunching in the shadow of the aqueduct near the western end of the valley of tombs, we visited the wells of Abul-Fawâris, half an hour west of the town. We found the water sweet and cool. It flows from one well to another by an aqueduct, about twenty feet below the surface. Although we did not take the level by barometer, there is no reason to doubt the correctness of Sheikh Mohammed's opinion, that this aqueduct was continuous with that in the street of tombs. As before mentioned, it is intended to re-establish the connection with the part of the aqueduct in the street of tombs, and lead the water again to the town. The ground about these wells was moist, and bore at the time an abundant crop of green forage, on which a herd of cows was feeding as

we passed. Among the plants growing in this meadow were *Hutchinsia petræa* (new for our district), *Onobrychis Olivieri*, *Tetradiclis Salsa*, and a species of *Astragalus* allied to *A. bombycinus*, perhaps a variety of it.

Three-quarters of an hour farther on we passed a hill fifteen minutes north of the road, on which we saw ruins. I rode up the hill and found the pedestal and capital of a column, but no shaft anywhere in sight. There were no other ruins. It is interesting to speculate whether the shaft was ever brought to the spot. It could not be easily hidden on a conspicuous hill like that on which the base is erected. There would be no motive to remove a shaft elsewhere. Unfinished monuments are very common in the East. There was no inscription to give any hint as to the date or purpose of these remains.

Immediately after passing this hill, we saw a heavy, black cloud gather an hour ahead on our path, and the play of lightning and rolling of thunder made us sure that there must be almost a waterspout at the theatre of the storm. The cloud, however, soon rolled away over the range of Jebel-'Ain-el-Wu'ûl, and two hours later we were wading in a suddenly-formed swamp, in water in some places 3 inches deep, where two days before we had passed over a desert baked and cracked by the fierce sunshine. This great salt marsh, covering about a hundred square miles, was overgrown with *Spinacea tetranda* (not before noted in Syria), with here and there mounds, on which grew clumps of *Tamarix tetragyna* and *Lycium Barbarum*. In the most swampy places we met with the curious spike of *Cynomorium coccineum* and *Phelipea lutea*.

In the middle of the swamp we met with three bases of columns, or altars. Two were entire, the third had only the sub-base. At a distance of a hundred yards to the west was a portion of a pillar, half buried in the soil. As we photographed these bases at a subsequent visit, and copied the inscriptions, I will reserve further comment on them for the narrative of that journey.

We arrived at el-Beida at 6 p.m., after a ride of five hours from the street of tombs at Palmyra.

Friday, April 11th, 'Ain-el-Beida.—At our previous visit, three days before, our barometers had read W. 27·8, B. 28·2. They now read W. 27·87, B. 28·45. The mean will give by W. 1,970 and by B. 1,700 feet above the sea.

Heights above Mediterranean Sea.

	Watson.	Browning.
Damascus	2,325	2,325
Maarca	4,200	4,200
,, ...	4,200	4,200
Ridge ab. Ma'lula	5,500	—
Yebrûd	4,550	4,600
,, ...	4,525	4,525
Deir Atiyah	4,000	4,025
Qaryetein	2,660	2,600

Heights above Mediterranean Sea—cont.

	Watson.	Browning.
'Ain el-Wu'ûl....	2,740	2,300
Top of Mount near Wu'al .. .	3,650	3,600
'Ain-el-Beiḍa	1,940	1,800
,, ...	2,000	1,600
Palmyra	1,480	1,300
El-Jebâh	2,550	2,285
Abu Dâli	2,070	2,170
Ḥems	1,625	1,770
Ḥadîdah	1,500	1,525

These are given without any allowance for temperature, and on the assumption that the instrumental error of each was constant.

A cold and dense fog covered the plain when we arose. We could not see a hundred feet away. Nevertheless, our guides decided that we could march, and we made an early start. For two hours the mist continued without a sign of breaking but by 10 a.m. it had rolled entirely away. At 11 we began to see figures moving along the south-western edge of the plain. At first our guides were uneasy, suspecting that it might be a marauding party, but it soon became evident that it was a large tribe in motion, with all its flocks and herds, migrating in the direction of Ḥems and Ḥamath. A little before noon our line of march crossed theirs, and we had some conversation with those whom we met. This tribe migrates in this direction every spring, to pasture the broad fields of the Orontes Plain after the harvest is over.

During the middle of the day the most characteristic plant which we found was *Ferula Blanchei*, a low species of that genus, about 18 inches high, called by the natives Abu-et-Ṭayyib. At the time of our journey the stalks were just coming into flower, and were quite tender and succulent. Our muleteers and guides stripped them of leaves, and ate freely of them. We tasted them, and found them not unlike celery. Doubtless they would make a very good salad, and also be palatable boiled, and served with a sauce, like asparagus. We also collected *Scorzonera lanata*, *Hyoseyamus muticus*, *Asphodeline brevicaulis*, beside other plants before mentioned.

For several hours in the middle of the day we were in sight of el-Qasr, which we passed a little after noon, two hours to the south of our route.

At about sunset we passed a small salt pool, among rugged hills, and at 7.30 p.m. reached el-Jebâh, where there is a perennial stream a foot or so in width, and 2 or 3 inches in depth. We had been told that there was a a river at Jebah. There is, in point of fact, a torrent bed by the hamlet, but it only runs during heavy showers. Great is the value of the tiniest rill in this parched land. It was quite dark before we had our tent pitched and our supper eaten, and we lay down to a rest earned by thirteen and a-half hours of hard work.

Saturday, April 12th, El-Jebâh.—6 a.m. Barometers, W. 27·3, B. 27·72;

height, W. 2,550, B. 2,285 feet—a little lower than Qaryetein, a fact verified subsequently.

Arriving as we had done the night before, at dusk, we obtained the impression of a village, an impression not borne out by the three or four miserable ruins of huts which we saw in the morning. We found, however, a field of wheat, of about 2 acres in extent, which is irrigated by the rill beside which we were encamped. Three old men live here to sow, tend, and reap this little Eden. And out of it they not only get their own support, but give half of the produce to Fayyad Agha of Qaryetein, who is the owner. We could not have had a more forcible commentary on the small value of human labour here than was furnished by this fact. In July, when we passed another night at el-Jebâh, we found these three old men threshing out the produce of the field, and irrigating some summer crops which they had planted.

The water at el-Jebâh has a decided odour and taste of sulphur, but much less pronounced than that of el-Beiḍa and Palmyra.

At an early hour we broke camp, and rode for two hours to el-Ghundhur, a wretched village at the edge of the desert. A ruin of Roman or more ancient times exists here. Only the lower courses of stone, however, are in place. The other material seems to have been pretty well broken up to build the village. Two copious springs of good water serve not only for drinking places, but to irrigate a considerable area of cultivated ground.

As we had now cleared the desert, we dismissed Khalid and Mohammed, our guards and guides through the wilderness. They returned to Qaryetein, three hours away, while we pursued our journey to es-Saïṭ, six hours to the north-east of el-Ghundhur. Our path lay over rolling, barren hills, which were not at that time utilised even for grazing. We passed a number of dolmens by the way, but all of rude construction and apparently modern.

At es-Saïṭ we came upon the first traces of grain growing without any irrigation, a fact which indicated that we had come within the sphere of regular and reliable rains. On our way from el-Ghundhur we had occasional floral evidence that we were passing from the desert to the fertile regions. *Allium Orientale*, *Astragalus Mitchelli Post* (a new species with pretty violet flowers, growing in great abundance), and *Camelina lasiocarpus* introduced us, and after passing es-Saïṭ we rapidly came one by one to the familiar plants of Coele-syria and the Ḥems tableland; *Onobrychis Sativa*, *L. var Montana*, *Alkanna strigosa*, *Veronica Orientalis*, *Salvia acetabulosa*, and, above all, *Asphodelus microcarpa*, the universal plant of the upland prairies as well as of the coast.

From es-Saïṭ to Abu-Dâli we passed for three hours over a rolling park-like country, more and more cultivated with broad and fertile wheat fields. We reached Abu Dâli at 9 p.m., after a fourteen hours' ride, and were glad to look forward to the rest of the coming Sabbath, and the end of our desert journey.

On Monday we passed through Hems, and on Tuesday afternoon reached Tripoli, whence we returned by steamer to Beirût.

The following is a list of the plants collected during this journey. The italicised words are the names of plants new to this region. Those in small capitals of new species :—

I.—Ranunculaceæ.

1. Adonis dentata, Del. Syrian desert, common.
2. Ranunculus Damascenus, Boiss. et Gaill. Damascus.
3. Ceratocephalus falcatus, Pers., var. vulgaris, Boiss. Common on the Damascus plateau and in the desert.
4. „ „ var. exscapus, Boiss. Damascus plateau.

II.—Papaveraceæ.

5. *Glaucium Arabicum, Fres.* Qaryetein to Wadi el Bâridi.
6. Rœmeria hybrida, Sih. Desert.
7. *Hypecoum grandiflorum, Boiss.* Common in the desert.

III.—Fumariaceæ.

8. Fumaria micrantha, Lag. Damascus.

IV.—Cruciferæ.

9. *Matthiola Damascena, Boiss.* Yebrûd to el-Mahîn.
10. *Arabis albida, Stev. var. umbrosa, Boiss.* Ma'arrah to Yebrûd
11. *Aubrietia Libanotica*, Boiss. Rocks near Yebrûd.
12. *Alyssum montanum, L.* Yebrûd.
13. „ *campestre, L.* Common everywhere.
14. „ *calycinum, L.* Jebel Qalamûn.
15. „ *dasycarpum, Steph.* Nebk to Qaryetein. Desert.
16. „ *aureum, Fenzl.* Qaryetein to el-Bâridi.
17. „ *meniocoides, Boiss.* Nebk to Qaryetein. Desert, common.
18. *Chrysochamela velutina, D. C.* Desert.
19. *Erophila minima, C. A. M.* Yebrûd. Desert.
20. „ *præcox, Stev.* Desert.
21. *Malcolmia Bungei, Boiss. var. glabrescens, Boiss.* Palmyra.
22. „ *Africana, L.*, type. Palmyra to 'Ain el Beida.
23. „ „ *var. squarrosa*, Post. Palmyra.
24. „ *torulosa, Desf., var. contortuplicata, Boiss.* Desert.
25. „ *crenulata, D. C.* Antilebanon and Desert. Common.
26. *Sisymbrium pumilum, Steph.* Yebrûd.
27. „ Sophia, L. Common throughout.
28. „ *runcinatum, Lag.* Wadi el Bâridi.
29. „ GRANDIFLORUM, *Post*, Sp. nov. Syrian desert.

30. Erysimum purpureum, Auch, var. Blancheanum, Post (E. Blancheanum, Boiss.). Plateau of Antilebanon and Syrian Desert.
31. *Leptaleum filifolium, D. C.* Syrian Desert. Palmyra
32. Camelina lasiocarpa, Boiss et Bl. Es-Saïṭ.
33. *Brassica Tournefortii, Gouan.* En-Nebk to el-Mahîn.
34. „ *deflexa, Boiss.* Qaryetein to el-Bâridi.
35. Diploṭaxis erucoides, L. Damascus.
36. Lepidium perfoliatum, L. Damascus.
37. Thlaspi perfoliatum, L. Yebrûd plateau.
38. Iberis odorata, L. Damascus plain.
39. *Æthionema cristatum, D. C.* Qaryetein to el-Bâridi.
40. *Hutchinsia petræa, L.* Wells of Abul-Fawâris, Palmyra.
41. Clypeola jonthlaspi, L. Qaryetein to el-Bâridi.
42. *Isatis Aleppica, Scop.* Qaryetein to el-Bâridi.
43. *Texiera glastifolia, D. C.* En-Nebk to el-Mahîn.
44. Chorispora Syriaca, Boiss. Damascus to el Mahîn.

V.—Capparideæ.

45. *Cleome glaucescens, D.C.* Palmyra.

VI.—Cistaceæ.

46. *Helianthomum Niloticum, L.* Palmyra. Desert everywhere.
47. „ *vesicarium, Boiss.* Qaryetein to el-Bâridi.

VII.—Violarieæ.

48. *Viola ebracteolata, Fenzl.* Near Yebrûd.

VIII.—Sileneæ.

49. Silene coniflora, Otth. Common throughout plateaux.
50. „ *bipartita, Desf. var. Olivieri.* Palmyra.

IX.—Alsineæ.

51. Holosteum umbellatum, L. Damascus. Desert. Palmyra.
52. Alsine picta, S et S. Damascus to Palmyra.
53. *Spergularia diandra, Guss.* Palmyra.

X.—Tamariscineæ.

54. *Tamarixtetragyna, Ehr.* Ain-el-Beiḍa to Palmyra.

XI.—Malvaceæ.

55. Malva Ægyptia, L. Desert.
56. „ *parviflora, L.* Palmyra.

XII.—Zygophylleæ.

57. Zygophyllum eurypterum, Boiss et Buhse. Wadi-el-Bâridi.
58. *Tetradiclis salsa, Stev.* Palmyra to 'Ain-el-Beiḍa.

XIII.—Geraniaceæ.

59. Erodium cicutarium, L. Qaryetein.
60. „ *cichonium, L.* Desert.
61. „ *laciniatum, Cav.* Palmyra.
62. „ *malacoides, L.* Palmyra.
63. „ *glaucophyllum*, Ait. Palmyra.
64. „ *Gaillardoti, Boiss.* Yebrûd to Qaryetein.

XIV.—Rhamnaceæ.

65. *Rhamnus Palæstina, Boiss.* Jebel-'Ain-el-Wu'ûl.

XV.—Anacardiaceæ.

66. *Pistacia mutica, F. and M.* Wadi-el-Bâridi.

XVI.—Leguminosæ.

67. *Medicago tribuloides, Dess.* Palmyra.
68. Trigonella micrantha, C. A. M. Damascus.
69. „ *azurea*, C. A. M. Palmyra.
70. „ filipes, Boiss. Palmyra.
71. „ *Arabica, Del.* Palmyra.
72. *Astragalus cruciatus, Link* var brachylobus, Post. Palmyra.
73. „ *callichroüs, Boiss.* Palmyra.
74. „ *conduplicatus, Bertol.* Desert.
75. „ *tuberculosus, D. C.* Borders of desert.
76. „ Palmyrensis, Post. Near Wells of Abul-Fawâris.[1]
77. „ *cretaceus, Boiss. et Ky.* Borders of desert.
78. „ *mollis, M. B.* En-Nebk to el-Mahîn.
79. „ Aleppicus Boiss. Damascus plain.
80. „ *Forskahlei, Boiss.* Desert. Palmyra.

[1] Perhaps a variety of A. bombycinus, Boiss.

81. *Astragalus* Mitchellii, Post. Sp. nov. El-Jebâh to el-Ghundhur ; Es-Saïṭ.
82. „ ancistrocarpus, Boiss et Haussk. Desert.
83. „ angulosus, D. C. Chalk hills north of Damascus.
84. „ *Trachoniticus, Post.* Syrian Desert.
85. *Onobrychis sativa, L. var. montana, Boiss.* Border of desert.
86. „ *Olivieri, Boiss.* Palmyra.
87. *Vicia Noëana, Reut.* Ḥems to Hadîdah.

XVII.—Rosaceæ.

88. Cerasus microcarpa, C. A. M. Wadi-el-Harîr.
89. „ umbellata, Post. Sp. nov. Wadi-el-Harîr.
90. *Prunus ursina, Ky.* Ma'arrah to Yebrûd.
91. „ *monticola, C. Koch* Wadi-el-Harîr.
92. Amygdalus communis, L. Antilebanon. Ma'arrah plateau.
93. *Rosa canina, L.* Yebrûd.

XVIII.—Crassulaceæ.

94. *Umbilicus Libanoticus*, Boiss. Jebel-'Ain-el-Wu'ûl.

XIX.—Mesembryanthemaceæ.

95. Aizoon Hispanicum, L. Palmyra.

XX.—Umbelliferæ.

96. Ferula Blanchei, Boiss. Desert.

XXI.—

97. *Valerianella truncata, Rchb.* Qaryetein.
98. „ *Kotschyi, Boiss.* Desert.

XXII.—Conysositeæ.

99. Bellis perennis, L. Ma'arrah to Yebrûd.
100. *Chamæmelum grandiflorum*, Boiss et Haussk, Ma'arah to Yebrûd.
101. „ *auriculatum*, Boiss. El-Beiḍa to el-Jebâh.
102. Matricaria aurea, L. Palmyra.
103. Achillæa „ var. discoidea, Boiss. Damascus.
104. Artemisia Herba-alba, L. Desert and contiguous regions.
105. Senecio coronopifolius, Desr. Desert.
106. *Carduus pycnocephalus, Jacq.* Palmyra.
107. Centaurea, sp. Palmyra.

108. Kœlpinia linearis, Pall. Palmyra.
109. *Lagoseris bifida, Vis.* Desert.
110. Taraxacum officinale, L. Ma'arrah to Yebrûd.
111. Zollikoferia, sp. Desert.
112. *Tragopogon buphtalmoides, Boiss. var. stenophyllum*, Boiss. Qaryetein to 'Ain-el-Beiḍa.
113. Scorzonera lanata, M. B. Table lands. Desert.
114. „ papposa, D. C. Desert.

XXIII.—Primulaceæ.

115. Androsace maxima, L. Damascus plain

XXIV.—Plumbaginaceæ.

116. *Statice spicata, Willd.* Palmyra.

XXV.—Apocynaceæ.

117. Vinca Libanotica, Zucc. Yebrûd.

XXVI.—Boragineæ.

118. *Asperugo procumbens, L.* Palmyra.
119. An undetermined species of Boraginea, genus uncertain Western half of desert.
120. *Anchusa Milleri, Willd?* Desert. Palmyra.
121. *Lithospermum tenuiflorum, L.* Palmyra.
122. „ *arvense, L.* Palmyra.
123. Arnebia cornuta, Ledeb. Palmyra. Desert.
124. Alkanna strigosa, Boiss. Es-Saiṭ to Abu-Dâli.

XXVII.—Solanaceæ.

125. *Lycium Barbarum, L.* Clumps in desert.
126. *Hyoscyamus reticulatus, L.* Qaryetein.
127. „ muticus, L. El-Beiḍa to el-Jebâh.

XXVIII.—Scrophulariaceæ.

128. Verbascum Galilæum, Boiss. Hems to Tripoli.
129. „ Damascenum, Boiss? Palmyra.
130. *Linaria Ascalonica, Boiss., var.* Brachyloba, Post. Palmyra.
131. „ *albifrons, S. and S.* Palmyra.

132. Scrophularia zanthoglossa, Boiss. Ḥems to Tel-Kelakh.
133. „ variegata, M. B., var. Libanotica, Boiss. Damascus to Ma'arrah.
134. *Veronica Orientalis, Mill.* Es-Saïṭ to Abu Dâli.
135. „ triphyllos, L. Palmyra. Nebk to Qaryetein.

XXIX.—Orobanchaceæ.

136. *Phelipea lutea, Desf.* Desert in salt marshes.

XXX.—Labiatæ.

137. Salvia acetabulosa, Vabl. Es-Saïṭ to Abu-Dâli.
138. „ *verbascifolia, M. B.* En-Nebk to el Mahîn.
139. „ *controversa, Ten.* Qaryetein.
140. „ *Verbenaca, L., var. vernalis,* Boiss. Qaryetein.
141. Nepeta cryptantha, Boiss. et Haussk. Ḥems to Tel Kelakh.
142. *Lallemantia Royleana, Wall.* El-Bâridi to 'Ain-el-Beiḍa
143. Zizyphora tenuior, L. Desert.
144. Stachys Arabica, Horn. Ḥems to el-Ḥadîdah.

XXXI.—Plantagineæ.

145. *Plantago albicans, L.* Palmyra.

XXXII.—Chenopodiaceæ.

146. *Spinacia tetrandra, Stev.* Palmyra to 'Ain-el-Beiḍa.

XXXIII.—Salsolaceæ.

147. Kochia sp. Desert.
148. Atriple Palæstinum, Boiss. Palmyra.
149. *Chenolea Arabica,* Boiss. Desert.

XXXIV.—Myrobalanaceæ.

150. *Cynomorium coccineum, L.* Palmyra to 'Ain-el-Beiḍa.

XXXV.—Euphorbiaceæ.

151. *Euphorbia Apios, L.* Desert.

XXXVI.—Orchidaceæ.

152. *Orchis incarnata, L.* Ḥems.

XXXVII.—Iridaceæ.

153. Iris Germanica, L. Ḥems to Tripoli.
154. „ *Sari, Baker.* Desert.
155. „ *Palæstina, Baker var.* Cærulea, Post. Desert.
156. *Ixiolirion montanum, Lab.* Palmyra.

XXXVIII.—Liliaceæ.

157. Asphodelus microcarpa, Viv. Es-Saïṭ to Abu-Dâli
158. *Asphodeline lutea, L.* Ḥems.
159. „ *brevicaulis, Bert.* El-Beiḍa to el-Jebâh.
160. *Allium Rothii, Zucc.* Desert.
161. „ *Orientale, Boiss.* El-Ghundhur to Es-Saïṭ
162. Muscari albicaule, Post, Sp. nov. El-Bâridi to Ain-el-Beiḍa.
163. „ *racemosum L.* Palmyra. Table lands
164. „ neglectum, Guss. En-Nebk to El Mahîn
165. *Bellevalia ciliata, Cyr.* Desert.
166. „ *flexuosa, Boiss.* Antilebanon. Palmyra
167. „ *densiflora, Boiss var.* Longipes, Post Ḥems.
168. *Ornithogalum lanceolatum, Lab.* Yebrûd.
169. „ *montanum, Cyr.* Jebel Qalamûn.
170. „ „ *var. platyphyllum*, Boiss Deser
171. „ *tenuifolium, Guss.* Desert.
172. *Tulipa montana, Lindl. var.* Amblyophylla Post. Jebe Ain-el-Wu'ûl.
173. „ *biflora, L.* En-Nebk to Qaryetein.
174. *Gagea reticulata, Pall.* Jebel Qalamûn.
175. „ *foliosa, Presl.* Yebrûd. Palmyra.
176. *Lloydia rubro-viridis, Baker.* Jebel Qalamûn.

XXXIX.—Cyperaceæ.

177. *Carex stenophylla, Vahl.* Ma'arrah to Zebrûd Desert

XL.—Gramineæ.

178. *Sphænopus divaricatus, Rehb.* Desert.
179. Poa bulbosa, L. Everywhere in the desert.
180. „ Sinaïca, Boiss. En-Nebk to Qaryetein. Desert
181. „ *Timoleontis, Held.* El-Beiḍa to el-Jebâh.
182. Vulpia pectinella, D. C. Palmyra.
183. *Festuca inops, Del.* Wadi el Bâridi.
184. Sclerochloa dura, Beauv. Qaryetein.
185. *Scleropoa Menophitica, Spr.* Palmyra

186. *Nardurus tenuiflorus, Boiss.* Palmyra.
187. *Orientalis, Boiss.* Qaryetein to el Bâridi.
188. Bromus matritensis, L. Palmyra.
189. *Aegilops crassa, Boiss.* Palmyra.
190. *Rhizocephalus Orientalis, Boiss.* Desert.

XLI.—Naiadaceæ.

191. Potamogeton crispus, L. Canal ; Damascus.

XLII.—Characeæ.

192. Chara, sp. Great fountain ; Palmyra.

XLIII.—Lichenes.

193. *Lecanora lentigera, Web.* Incrustation in salty ground.

COMPARISON OF THE ATMOSPHERIC PRESSURE IN PALESTINE AND IN ENGLAND IN THE TEN YEARS ENDING 1889.

By James Glaisher, F.R.S.

In the quarterly reports of the Palestine Exploration Fund, beginning July, 1888, and ending October, 1890, the results of observations taken at Sarona in the ten years ending 1889 have been published.

The observations at Sarona were taken a little north of the great orange groves of Jaffa, at a place one mile and a half from the sea shore, and about 50 feet above the sea level, in lat. 32° 4′ N. and long. 34° 34′ E., by Herr J. Dreher.

The observations at Blackheath were taken during the same ten years, at about 150 feet above the sea level, in lat. 51° 29′ and long. 0° 1′ E., by myself.

The observations at Sarona have been reduced to 32° Fah., and those at Blackheath have been corrected for the difference of elevation of 100 feet and reduced to 32° Fah.

TABLE I. shows the Highest Reading of the Barometer at *Sarona* in each month.

Months.	Years.										Means of 10 Years.
	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
January ..	30·269	30·235	30·220	30·088	30·262	30·151	30·128	30·285	30·166	30·073	30·188
February..	30·155	30·007	30·249	30·099	30·230	30·097	30·065	30·239	30·137	33·090	30·137
March ..	30·166	30·175	30·132	30·060	30·133	30·109	30·115	30·063	30·144	30·059	30·116
April ..	30·051	30·035	30·114	30·042	30·013	29·995	30·034	29·993	29·992	30·051	30·032
May ..	29·947	29·957	30·017	29·953	29·946	29·905	30·007	30·061	29·939	29·918	29·965
June ..	29·953	29·957	29·995	29·805	29·930	29·886	29·845	29·865	29·874	29·942	29·905
July ..	29·791	29·860	29·798	29·771	29·899	29·793	29·795	29·893	29·809	29·823	29·823
August ..	29·827	29·871	29·801	29·803	29·849	29·825	29·754	29·766	29·767	29·788	29·805
September	29·925	29·940	29·949	29·901	30·015	30·073	29·893	29·966	29·943	29·882	29·979
October ..	30·018	29·994	29·983	29·977	30·002	29·970	29·939	29·964	30·048	30·019	29·991
November	30·091	30·076	30·073	30·020	30·063	30·088	30·109	30·099	30·139	30·136	30·089
December	30·180	30·232	30·153	30·106	30·143	30·162	30·164	30·087	30·272	30·185	30·168
Means ..	30·031	30·028	30·040	29·969	30·040	30·030	29·987	30·023	30·019	29·997	30·017

In this table, the fact of the reading of the barometer in the six months from May to October so seldom reaching 30 inches is the first to notice. The reading exceeds 30 inches in every January, February, March, November, and December; in seven Aprils out of the ten; in three Mays, in two Septembers; in four Octobers; and there is no instance in the months of June, July, and August of a reading so high as 30 inches.

The maximum for the year has occurred in—

	The maximum was Ins.		
January, 4 times, viz., in 1880, 1881, 1884, and 1887	30·285	in	1887
February, once	30·249	„	1882
December, 5 times, in 1883, 1885, 1886, 1888, and 1889	30·272	„	1888

The lowest of the monthly maximum readings has occurred five times in July and five times in August, viz. :—

	The lowest was Ins.		
July, in 1880, 1881, 1882, 1883 and 1885	29·771	in	1883
August, in 1884, 1886, 1887, 1888, and 1889	29·754	„	1886

The numbers at the foot of the columns give the mean of each year; the largest, 30·04, was in 1882 and 1884, and the smallest, 29·969, in 1883.

In the last column is shown the mean of the ten highest readings in each month. The highest, 30·188 is in January; the next in order is 30·168 in December. The lowest is 29·805 in August; the next in order is 29·823 in July.

The mean of all is 30·017 inches.

TABLE II. shows the Highest Reading of the Barometer at *Blackheath* in each month.

Months.	Years.										Means of 10 years.
	1880.	1881.	1882	1883.	1884.	1885.	1886.	1887.	1888.	1889.	
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
January ..	30·606	30·515	30·890	30·597	30·568	30·354	30·064	30·622	30·647	30·656	30·552
February..	30·406	30·195	30·771	30·765	30·411	30·132	30·659	30·664	30·280	30·342	30·462
March ..	30·428	30·469	30·577	30·660	30·204	30·561	30·349	30·564	30 266	30·517	30·460
April ..	30·376	30·193	30·293	30·592	30·031	30·251	30·209	30·639	30·175	30·168	30·293
May ..	30·408	30·592	30·414	30·331	30·375	30·091	30·433	30·340	30·422	30·010	30·342
June ..	30·167	30·255	30 266	30·332	30·268	30·346	30·226	30·388	30·175	30·358	30·280
July ..	30·114	30·271	30·409	30·105	30·155	30·381	30·275	30·271	30·029	30.301	30·231
August ..	30·194	30·265	30·215	30·240	30·246	30·283	30·176	30·289	30·207	30·210	30·233
September	30·436	30·364	30·314	30·208	30·307	30·295	30·361	30·421	30·402	30·387	30·350
October ..	30·353	30·414	30·464	30·470	30·584	30·094	30·307	30·546	30·406	30·116	30·375
November	30·396	30·379	30·066	30·357	30·490	30·361	30·658	30·259	30·140	30·609	30·372
December	30·599	30·558	30·356	30·520	30·170	30·511	30·525	30·442	30·425	30·544	30·465
Means ..	30·374	30·372	30·420	30·431	30·401	30·305	30·353	30·454	30·298	30·352	30·368

A very marked difference is shown in this table from the corresponding one at Sarona, the reading being above 30 inches in every month.

The maximum for the year has occurred in—

	The highest was Ins.		
January, 4 times, in 1880, 1882, 1888, and 1889	30·890	in	1882
February, 3 times, in 1883, 1886, and 1887	30·765	„	1886
March, once	30·561	„	1885
May, once	30·592	„	1881
October, once	30·584	„	1884

Thus a very marked difference, excepting in the case of January, is shown from the times of maximum pressure at Sarona.

The lowest maximums for the year has occurred in—

	The lowest was Ins		
January, once	30·064	in	1880
February, once	30·195	„	1881
April, once	30·031	„	1884
May, twice, in 1885 and 1889	30·010	„	1889
July, 3 times, in 1880, 1883 and 1888	30·029	„	1888
November, twice, in 1882 and 1887	30·066	„	1882

The numbers at the foot of the columns give the mean of each year; the largest, 30·454 inches, in 1887, and the smallest, 30·298 inches, in 1888.

The number in the last column shows the mean of the ten readings.

The highest, 30·552, is in January; and the next in order, 30·465, in December. The lowest is 30·231 in July, and the next in order is 30·233 in August. These months are in agreement with those at Sarona, and thus, though at Blackheath there was no absolute maximum in December, yet its general high pressure has the second place on the mean as at Sarona. The mean of all is 30·368 inches.

If we compare the numbers in Tables I and II together month by month, we shall see that at Blackheath the maximum atmospheric pressure has been greater in every month but two, viz., in November, 1882, and in January, 1887, when the pressure at Sarona rose higher by 0·007 inch and 0·064 inch respectively than at Blackheath. Again, in November, 1888, the difference was only 0·001 inch. In every other month the atmospheric pressure at Sarona was less than at Blackheath, and in some months by as much as six-tenths of an inch, viz., in May, 1881; January and July in 1882; February, March, and May, 1883; and April, 1887. By taking the difference between the number in the last column of the two preceding tables, the mean excess of maximum atmospheric pressure at Blackheath over that at Sarona is :—

	In.		In.		In.
January	0·364	May	0·377	September....	0·371
February	0·325	June	0·375	October	0·384
March	0·344	July	0·408	November....	0·283
April	0·261	August	0·428	December	0·297

TABLE III. shows the Lowest Reading of the Barometer at *Sarona* in each month.

Month.	Years.										Means of 10 years.
	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
January ..	29·873	29·751	29·855	29·527	29·678	29·616	29·682	29·442	29·709	29·718	29·688
February..	29·635	29·524	29·706	29·624	29·700	29·716	29·620	29·724	29·529	29·656	29·643
March ..	29·615	29·579	29·631	29·631	29·597	29·500	29·584	29·713	29·592	29·571	29·604
April ..	29·489	29·545	29·581	29·533	29·505	29·482	29·543	29·522	29·550	29·679	29·543
May ..	29·640	29·637	29·609	29·635	29·670	29·687	29·686	29·704	29·690	29·559	29·652
June ..	29·609	29·697	29·684	29·666	29·703	29·630	29·609	29·654	29·615	29·583	29·648
July ..	29·556	29·563	29·545	29·597	29·600	29·509	29·567	29·573	29·574	29·494	29·558
August ..	29·584	29·570	29·630	29·563	29·582	29·535	29·622	29·567	29·599	29·587	29·584
September	29·720	29·663	29·712	29·607	29·665	29·663	29·674	29·670	29·664	29·622	29·666
October ..	29·819	29·823	29·729	29·751	29·783	29·778	29·734	29·860	29·720	29·790	29·779
November	29·780	29·747	29·773	26·687	29·832	29·822	29·814	29·713	29·553	29·800	29·752
December	29·748	29·784	29·722	29·705	29·846	29·780	29·674	29·776	29·547	29·643	29·723
Means ..	29·672	29·657	29·681	29·627	29·680	29·643	29·651	29·662	29·614	29·644	29·662

The numbers in this table show very small differences from each other, and there is not one reading so small as 29·4 inches, differing in this respect very much from our experience in England.

The minimum at Sarona for the year has occurred in—

	The lowest was Ins.		
January, twice, in 1883 and 1887	29·442	in	1887
February, twice, in 1881 and 1888	29·524	„	1881
April, 4 times, in 1880, 1884, 1885, and 1886	29·482	„	1885
July, twice, in 1882 and 1889	29·494	„	1889

The highest minimum for the year has occurred in—

	The highest was Ins.		
January, twice, in 1880 and 1882	29·873	in	1880
October, 4 times, in 1881, 1883, 1887, and 1888	29·860	„	1887
November, 3 times, in 1885, 1886, and 1889	29·822	„	1885
December, once....	29·846	„	1884

The numbers at the foot of the columns give the mean for each year the largest was 29·681 in 1882 and the smallest 29·614 in 1888.

The numbers in the last column show the mean of the ten readings. The lowest is in April, 29·543 inches, and the next in order is July, 29·553 inches. The highest, 29·779 inches, is in October, and the next in order, 29·752 inches, is in November. The mean of all is 29·662 inches.

TABLE IV. shows the Lowest Readings of the Barometer at *Blackheath* in each Month.

Months.	Years.										Means of 10 years.
	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
January ..	29·874	28·816	29·196	29.150	28·460	28·838	28·964	28·736	29·165	29·339	29·054
February..	28·913	28·851	28·912	28·890	29·316	28·975	29·183	29·608	29·381	29·101	29·176
March ..	29·226	29·167	28·915	29·176	29·175	29·193	29·236	28·999	28·646	28·908	29·064
April ..	29·231	29·604	28·801	29.347	29·269	29·177	29·145	29·245	29·514	29·133	29·247
May ..	29·603	29·396	29·281	29·458	29·287	29·069	29·027	29·338	29·323	29·456	29·324
June ..	29·566	29·344	29·384	29·691	29·474	29·453	29·664	29·585	29.470	29·579	29·521
July ..	29·418	29·441	29·319	29·479	29·544	29·795	29·431	29·581	29·375	29·473	29·486
August ..	29·191	29·384	29·206	29·531	29·576	29·593	29·457	29·403	29·571	29·168	29·408
September.	29·166	29·383	29·166	28·748	29·355	29·392	29·587	29·206	29·605	29·391	29·300
October ..	28·716	29·008	28·719	29·349	29·316	28·875	28·548	29·228	29·210	29·099	29·007
November	28·651	28·959	29·050	28.900	29·635	29·194	28·900	28·751	29·136	29·447	29·062
December .	29·102	28·864	28·965	29·445	28·804	29·445	28·254	29·214	29·033	29·223	29·035
Means ..	29·221	29·185	29·076	29·264	29·268	29·250	29·118	29·241	29·286	29·276	29·224

Very remarkable indeed are the numbers in this table as compared with those in the corresponding table at Sarona. In every year the atmospheric pressure has been less than 29 inches, and with few exceptions the readings have been lower than those at Sarona, and in some months by an inch or more, viz., October and November, 1880; October, 1882; January and December, 1884; October, 1886; with numerous instances of 0·7 inch, 0·8 inch, and 0·9 inch. There are, however, a few instances in which the minimum at Sarona was lower than at Blackheath, viz., January, 1880; April, 1881; June, 1883; July and August, 1885; June, 1886; and July, 1887; that in July, 1885 by the large amount of 0·286 inch.

The minimum at Blackeath for the year has occurred in—

	The lowest was Ins.		
January, 4 times, in 1881, 1884, 1885, and 1887	28·460	in	1884
March, twice, in 1888 and 1889	28·646	„	1888
September, once	28·748	„	1883
October, once	28·719	„	1882
November, once	28·651	„	1880
December, once	28·254	„	1886

The highest minimum for the year has occurred in—

	The highest was Ins.		
January, once	29·874	in	1880
February, once	29·608	„	1887
April, once	29·604	„	1881
June, 4 times, in 1882, 1883, 1886, and 1889	29·691	„	1883
July, once	29·795	„	1885
September, once	29·605	„	1888
November, once	29·635	„	1884

The numbers at the foot of the columns give the mean for each year; the largest was 29·286 inches, in 1888, and the smallest 29·076 inches, in 1882.

The numbers in last column show the mean of the ten minimum readings:—The lowest, 29·007 inches, in October, and the next in order, 29·035 inches, in December. The highest, 29·521 inches, in June, and the next in order, 29·486 inches, in July.

By taking the difference between the number in the last column of Tables III. and IV. the average lower barometer readings in England below those in Palestine will be shown, viz.:—

	In.		In.		In.
January	0·634	May	0·328	September	0·366
February	0·467	June	0·127	October	0·772
March	0·540	July	0·072	November	0·690
April	0·296	August	0·176	December	0 688

The mean of all is 0·438 inch.

TABLE V. shows the Range of Barometer Reading at *Sarona* in each month.

Months.	Years.										Means of 10 Years.
	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
January ..	0·396	0·384	0·365	0·561	0·584	0·535	0·446	0·843	0·457	0·325	0·490
February..	0·520	0·583	0·513	0·475	0·530	0·381	0·445	0·515	0·608	0·434	0·503
March ..	0·551	0·596	0·501	0·429	0·536	0·609	0·531	0·320	0·552	0·488	0·511
April ..	0·562	0·490	0·533	0·509	0·508	0·513	0·491	0·471	0·442	0·372	0·489
May ..	0·307	0·320	0·408	0·318	0·276	0·218	0·321	0·357	0·249	0·359	0·313
June ..	0·344	0·260	0·311	0·139	0·227	0·256	0·236	0·211	0·229	0·359	0·257
July ..	0·235	0·297	0·253	0·174	0·299	0·284	0·228	0·320	0·235	0·329	0·265
August ..	0·243	0·301	0·171	0·240	0·267	0·290	0·132	0·199	0·168	0·201	0·201
September	0·205	0·277	0·237	0·294	0·350	0·710	0·219	0·296	0·279	0·260	0·292
October ..	0·199	0·171	0·254	0·226	0·219	0·192	0·205	0·158	0·328	0·229	0·248
November	0·311	0·309	0·300	0·333	0·231	0·266	0·295	0·386	0·586	0·336	0·335
December	0·432	0·448	0·431	0·401	0·297	0·382	0·490	0·311	0·725	0·542	0·446
Means ..	0·359	0·371	0·359	0·312	0·360	0·386	0·337	0·366	0·405	0·353	0·362

The greatest ranges appear in the winter and spring months, and the smallest in the summer and autumn months.

The greatest monthly range in the year has occurred in—

	The largest was Ins.		
January, 3 times, in 1883, 1884 and 1887	0·843	in	1887
February, once	0·543	„	1882
March, twice, in 1881 and 1886	0·596	„	1881
April, once	0·562	„	1880
September, once	0·710	„	1885
December, twice, in 1888 and 1889	0·725	„	1888

The least monthly range in the year has occurred in—

	The smallest was Ins.		
June, once	0·139	in	1883
August, 4 times, in 1882, 1886, 1888, and 1889	0·132	„	1886
October, 5 times, in 1880, 1881, 1884, 1885, and 1887	0·158	„	1887

These small ranges are remarkable.

The mean monthly range in each year is shown at the foot of each column. The largest is 0·405 inch, in 1888, and the smallest, 0·337 inch in 1886. The mean monthly range is 0·362 inch.

The numbers in the last column show the mean range in each month. The largest, 0·511 inch, is in March, and the next in order, 0·503 inch is in February. The smallest, 0·201 inch, is in August, and the next in order, 0·248 inch, is in October.

TABLE VI. shows the Range of Barometer Reading at *Blackheath* in each month.

Month.	Years.										Means of 10 years.
	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
January ..	0·732	1·699	1·694	1·447	2·108	1·516	1·100	1·886	1·482	1·317	1·498
February..	1·493	1·344	1·859	1·875	1·095	1·157	1·476	1·056	0·899	1·241	1·319
March ..	1·202	1·302	1·662	1·484	1·029	1·368	1·113	1·565	1·620	1·609	1·395
April ..	1·145	0·589	1·492	1·245	0·762	1·074	1·064	1·394	0·661	1·035	1·146
May ..	0·805	1·196	1·133	0·873	1·088	1·022	1·406	1·002	1·099	0·554	1·018
June ..	0·601	0·911	0·882	0·641	0·794	0·893	0·562	0·803	0·705	0·779	0·757
July ..	0·696	0·830	1·090	0·626	0·611	0·586	0·844	0·690	0·654	0·828	0·746
August ..	0·996	0·881	1·009	0·709	0·670	0·690	0·718	0·886	0·636	1·042	0·824
September	1·270	0·981	1·139	1·460	0·952	0·903	0·774	1·215	0·797	0·996	1·049
October ..	1·637	1·406	1·745	1·121	1·268	1·269	1·759	1·318	1·196	1·017	1·374
November	1·745	1·420	1·016	1·457	0·855	1·167	1·758	1·508	1·004	1·162	1·409
December	1·497	1·693	1·391	1·075	1·366	1·066	2·271	1·228	1·392	1·321	1·330
Means ..	1·152	1·188	1·351	1·168	1·050	1·059	1·237	1·213	1·112	1·075	1·158

These ranges differ very greatly from those in the preceding table, as at Sarona the greatest appear in the months of Winter and Spring, and frequently exceeding an inch, and in two instances, viz., in January, 1885, and December, 1886, exceeding 2 inches. The smallest appear in June, July, and August.

The largest monthly range in the year has occurred in—

	The largest was Ins.	
January, 4 times, in 1881, 1884, 1885, and 1887	2·108 ins.	in 1884
February, twice, in 1882 and 1883	1·875 in.	„ 1883
March, twice, in 1888 and 1889	1·620 „	„ 1888
November, once	1 745 „	„ 1880
December, once....	2·271 ins.	„ 1886

Agreeing generally in the months with those at Sarona.

The smallest monthly range at Blackheath in the year has occurred in—

	The smallest was Ins.	
April, once	0·589	in 1881
May, once	0·554	„ 1889
June, 3 times, in 1880, 1882 and 1886	0·562	„ 1886
July, 4 times, in 1883, 1884, 1885, and 1887....	0·586	„ 1885
August, once	0.636	„ 1888

Differing generally in the months with those at Sarona.

The mean monthly range in each year is shown at the foot of each column. The largest, 1·351 inch, in 1882, and the smallest, 1·075 inch, in 1889. The mean monthly range is 1·158 inch.

The numbers in the last column show the mean range in each month. The largest, 1·498 inch, in January, the next in order, 1·409 inch, is in November. The smallest, 0·746 inch, in July, and the next in order, 0·757 inch, in June.

By comparing the numbers in the Tables V. and VI. it will be seen that the range in every month was larger at Blackheath that at Sarona; the least difference was about a quarter of an inch in the months of June, 1880 and April, 1884; there are many instances exceeding 1 inch, and three exceeding 1½ inches in the months of January, 1884, and October and December, 1886.

By taking the difference between the numbers in the last column of Tables V. and VI., the greater range of atmospheric pressure in England over that in Palestine is shown in every month, and are—

	In.		In.		In.
January	1·008	May	0·705	September....	0·757
February	0·846	June	0·500	October	1·126
March	0·884	July	0·480	November....	1·074
April	0·657	August	0·623	December	0·884

By dividing the mean range in each month at Blackheath by the mean range at Sarona, it will be found that the range at Blackheath in—

April	is about	$2\frac{1}{4}$	times larger than at Sarona.
February, March and July	,,	$2\frac{3}{4}$	,, ,,
January, June and December	,,	3	,, ,,
May	,,	$3\frac{1}{4}$	,, ,,
September	,,	$3\frac{1}{2}$	,, ,,
November	,,	$4\frac{1}{4}$	,, ,,
October	,,	$5\frac{1}{2}$	,, ,,

The mean annual range was at—

	In.
Blackheath	1·985
Sarona	0·711

The highest reading during the 10 years, at—

	Was Ins.		January
Blackheath	30·890	in	1882
Sarona	30·285	,,	1887

The lowest reading during the 10 years, at—

	Was Ins.		January
Blackheath	28·254	in	1886
Sarona	29·442	,,	1887

The extreme range was at—

Blackheath	2·436 ins.
Sarona	0·843 in.

so that the range at Sarona was about $\frac{1}{3}$ of that in England.

TABLE VII. shows the Mean Monthly Reading of the Barometer at *Sarawa* in each month.

Months.	Years.										Means of 10 Years.
	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
January ..	30·046	29·997	30·060	29·898	30·010	29·919	29·946	29·866	29·958	29·921	29·962
February..	29·942	29·838	30·000	29·924	29·945	29·929	29·871	29·958	29·870	29·939	29·922
March ..	29·882	29·917	29·930	29. 838	29·892	29·861	29·879	29·909	29·878	29·872	29·885
April ..	29·814	29·828	29·797	29·775	29·723	29·706	29·858	29·781	29·795	29·859	29·794
May ..	29·776	29·821	29·810	29·801	29·841	29·813	29·815	29·844	29·817	29·752	29·815
June ..	29 741	29·816	29·806	29·735	29·828	29·776	29·746	29·714	29·768	29·770	29·773
July	29·679	29·705	29·689	29·689	29·717	29·679	29·677	29·671	29·672	29·648	29·683
August ..	29·716	29·675	29·705	29·697	29·707	29·657	29·685	29·653	29·696	29·665	29·686
September	29·808	29·792	29·803	29·718	29·817	29·798	29·790	29·802	29·802	29·770	29·793
October ..	29·916	29·902	29·771	29·886	29·909	29·904	29·840	29·875	29·855	29·893	29·874
November .	30·019	29·919	29·919	29·895	29·952	29·921	29·918	29·930	29·922	29·967	29·939
December .	29·944	29·975	29·953	29·924	29·980	29·950	29·979	29·949	29·977	29·953	29·958
Means ..	29·857	29·857	29·856	29·818	29·859	29·826	29·839	29·822	29·834	29·831	29·849

The mean monthly readings are highest in the winter months, but very seldom so high as 30 inches ; the lowest are in the summer months, but none so low as 29·6 inches, so that the mean monthly atmospheric pressure is very uniform.

The highest monthly mean reading of the barometer at Sarona, in the year, has occurred in—

	The highest was Ins.		
January, 4 times, in 1880, 1881, 1882, and 1884	30·060	in	1882
February, twice in 1883 and 1887	29·958	„	1887
November, once	29·967	„	1889
December, 3 times, in 1885, 1886, and 1888	29·979	„	1886

so that the months of highest mean pressure are January, February, November, and December.

The lowest monthly mean reading of the barometer at Sarona in the year has occurred in—

	The lowest was Ins.		
July, 6 times, in 1880, 1882, 1883, 1886, 1888, and 1889	29·648	in	1889
August, 4 times, in 1881, 1884, 1885, and 1887	29·653	„	1887

so that the months of lowest mean atmospheric pressure are July and August.

The numbers at the foot of each column show the mean yearly pressure ; the highest, 29·859, was in 1884, and the lowest, 29·818, was in 1883.

The numbers in the last column show the mean of the ten monthly mean readings. The highest, 29·962 inches, is in January, and the next in order, 29·958 inches, is in December. The lowest, 29·683 inches, is in July, and the next in order, 29·686, is in August. The general mean pressure is 29·849 inches.

TABLE VIII. shows the Mean Monthly Reading of the Barometer at *Blackheath* in each month.

Months.	Years.										Means of 10 Years.
	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
January ..	30·309	29·814	30·288	29·842	30·025	29·829	29·584	29·953	30·158	30·101	29·990
February..	29·737	29·753	30·054	30·019	29·855	29·647	30·054	30·248	29·888	29·824	29·918
March ..	30·034	29·819	29·847	29·856	29·871	30·006	29·918	29·988	29·530	29·891	29·886
April ..	29·811	29·867	29·713	29·934	29·755	29·721	29·844	29·928	29·811	29·661	29·805
May ..	30·013	30·037	29·988	29·897	29·932	29·731	29·856	29·941	29·979	29·758	29·913
June ..	29·840	29·910	29·852	29·906	29·970	29·955	29·905	30·127	29·861	29·949	29·928
July ..	29·830	29·929	29·814	29·801	29·894	30·104	29·850	29·979	29·711	29·860	29·877
August ..	29·906	29·792	29·852	29·948	29·934	29·907	29·934	29·915	29·944	29·712	29·894
September	29·905	29·908	29·796	29·769	29·956	29 826	29·981	29·868	30·074	29·974	29·906
October ..	29·804	29·936	29·770	29·912	30·005	29·632	29·729	30·017	29·985	29 627	29·842
November	29·891	29·895	29 538	29·749	30·087	29·835	29·855	29·631	29·730	30·135	29·845
December	29·854	29·932	29·621	30·086	29·808	30·144	29·635	29·783	29·906	30·109	29·888
Means ..	29·911	29·816	29·869	29 893	29·924	29·861	29·847	29·948	29·882	29·892	29·891

The mean monthly readings are highest in the winter months, as at Sarona, the readings often exceeding 30 inches, excepting in the months of April and August, in which months, in none of the years, the reading reached 30 inches. The lowest reading was in January, 1886.

The highest monthly reading of the barometer at Blackheath, in the year, has occurred in—

	The highest was Ins.		
January, 3 times, in 1880, 1882 and 1888	30·309	in	1880
February, twice, 1886 and 1887	30·248	„	1887
May, once	30·037	„	1881
November, twice, in 1884 and 1889	30·135	„	1889
December, twice, in 1883 and 1885	30·144	„	1885

The months agreeing, with the exception of the one instance in May, with those at Sarona.

The lowest monthly mean reading of the barometer at Blackheath, in the year, has occurred in—

	The lowest was Ins.		
January, once	29·584	in	1886
February, twice, in 1880 and 1881	29·737	„	1880
March, once	29·530	„	1888
April, once	29·755	„	1884
October, twice, in 1885 and 1889	29·627	„	1889
November, twice, in 1883 and 1887	29·631	„	1887
December, once	29·621	„	1882

These months differ entirely from those at Sarona. The numbers at the foot of each column show the mean yearly pressure, the greatest as 29·948 in 1887, and the least 29·816 in 1881.

The numbers in the last column shew the mean of the ten monthly mean readings. The highest, 29·990 inches, is in January, and the next in order is 29·928 inches, in June. The lowest, 29·805 inches, is in April, and the next in order, 29·842 inches, in October.

The average pressure of the ten years is 29·891 inches, whilst that at Sarona is 29·849 inches, so that the air over the two places is nearly the same in volume.

By comparing the results in Tables VII. and VIII. together we find that with the exception of three months, June, July and August, the mean pressure of the atmosphere at Blackheath has been in some years above, and in others below, that at Sarona; for instance the mean pressure at Blackheath was greater than at Sarona in—

		In.				In.
January, 1880	by	0·263	and smaller in	1886	by	0·362
February, 1887 ...	„	0·290	„	1885	„	0·282
March, 1880	„	0·152	„	1888	„	0·348
April, 1883	„	0·159	„	1889	„	0·198
October, 1889	„	0·266	„	1885	„	0·272
November, 1889....	„	0·168	„	1882	„	0·381
December, 1885	„	0·194	„	1886	„	0·344

In the months of May and September there was only one instance in each of these months, in the 10 years, of the pressure being less at Blackheath than at Sarona. It was greater than at Sarona in—

		In.				In.
May, 1880	by	0·237	and smaller in	1885	„	0·082
September, 1888....	„	0·272	„	1882	„	0·007

and in the remaining months the pressure at Blackheath was always greater. The excess varied in—

		In.				In.		
June	.... from	0·046	in	1882	to	0·383	in	1887
July	.... „	0·039	„	1888	„	0·425	„	1885
August	.... „	0·047	„	1889	„	0·262	„	1887

By taking the differences between the numbers in the last column of Tables VII and VIII, we find that the mean reading of the barometer at Blackheath was higher than at Sarona, in—

	In		In.		In.
January	by 0·028	May	by 0·098	August	by 0·208
March	„ 0·001	June	„ 0.155	September	„ 0·113
April	„ 0·011	July	„ 0·194		

and lower in the months of—

In.		In.		In.
February by 0·004	October	by 0·032	November	by 0·094
	December	„ 0·070		

CHRONOLOGY OF POTTERY.

By W. M. Flinders Petrie.

I am sorry to see an assertion in the last *Quarterly Statement* (p. 329) that "deductions from pottery" "are apt to mislead." This is a serious thing to say, as a knowledge of pottery is really the essential key to all archæological research.

I have never found it mislead; and I think no person has tested and tried it more completely. Whenever digging is going on I look at every scrap of pottery that is found, for each man has orders to heap up for my inspection every sherd he finds in his work. Then I recognise the style of each piece, and consider if it accords or disagrees with the conclusions that I have already formed as to the age of the deposits.

Last spring I estimated that the marks of potters and owners, found on potsherds, occurred on one piece in 5,000 to 10,000, both in Egypt and Syria; this estimate was made by the number of baskets of potsherds searched, or the number of sherds looked at on the ground in a minute, before a marked piece is found. Thus the number of marks found serves as a rough tally of the whole number of pieces seen. At Lachish I must have looked over about 50,000 or more pieces. In Egypt in the last two years about 3,000,000 pieces have been clearly looked at by me.

If after such searching during the last nine years I have never yet seen any distinctive pottery of any age which I could mistake for that of any other known period, though I was always searching and looking for exceptions—or anything which disagreed with the conclusions which I was forming—I think it is justifiable to say that deductions from pottery are not misleading.

Of course, the subject needs to be learned before it can be used, like any other study. But no excavations can yield their proper fruits without using this main key to understanding them.

I may say that eight periods can already be distinguished as entirely different in their pottery in Palestine; and more detailed research, with the aid of dated monuments, would greatly subdivide this chronological scale.

25*th October*, 1890.

NOTES BY MAJOR CONDER.

I.

Chronology of Pottery.

That the chronology of pottery is more likely to give good results in the hands of Mr. Petrie than of most antiquarians, I feel convinced, on account of his experience. The distinctions between early pottery, and that of Byzantine or Roman times, is also well marked; but, as Mr. Petrie has himself noted, the old black pottery is still made in Palestine.

The question is, whether the results as to date agree with those which may be deduced, with greater certainty, from other data. No scholar acquainted with the history of letters can doubt that the Lachish text, found by Mr. Petrie, dates about 7–800 B.C., and I think the date of the capital is also fairly certain. Yet Mr. Petrie has suggested much earlier dates for Lachish ruins, being guided I understand by the pottery. I do not know that any data exist whereby to judge of the age of "Amorite" pottery, or how it is known to be "Amorite," especially as the Amorites lived in the Hebron mountains, and not in the Philistine plains.

I had seven years' experience of pottery of every age in Palestine, and always examined that found at the ruins. But I consider that the character of lettering on texts, the character of the tombs found at a ruin, and of the masonry and architecture, form together much safer data for determining date than can be ever expected to result from study of the uninscribed pottery.

II.

The Hebrew Weights.

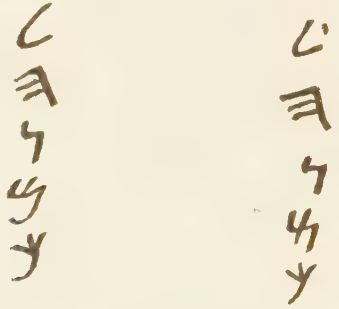
The weights published in the last *Quarterly Statement* weigh 80 grains and represent the quarter of a weight of 320 grains—that is to say, a quarter of a shekel. As my father, the late F. R. Conder, M. Inst. C.E., pointed out more than ten years ago, the old Hebrew shekel had this weight (*see* "Conder's Handbook to the Bible," p. 63). Maimonides ("Constit de Siclis," 1-2) says that, under the Hebrew Kings, the shekel weighed 320 grains of barley, and this would weigh close upon 320 grains Troy. Moreover (p. 64), this determination my father checked by the Assyrian weights from Nineveh, and got the same result. In a later time (*see* p. 63) the values were changed, but the old Hebrew shekel was worth 3*s.* 4*d.* of our money.

This being, therefore, so fully confirmed by the recent discovery, the reading of של should be regarded as a contraction from שקל, *shekel*, and it has nothing to do with Israel. The word נצב probably comes from יצב, "to establish," as Dr. Neubauer has suggested, and would mean "standard." There is no known notice of a weight so called, as far as my reading goes, nor is it necessary to drag in the "Hittites," concerning whose weights we know nothing. It appears that in the Greek town of Naucratis the same standard of weight was used, that was common to Assyrians, Phœnicians, and Hebrews.

III.

The Lachish Inscription.[1]

This may, I think, very clearly be read להנך, and the forms of the letters resemble those in use about 700 B.C., as shown opposite, the second column being from certain gems of that date.



The translation is in this case very clear. In Aramaic we find the root הנא, "profit," "health," "wholesomeness," and in Arabic, هَنَا has the same meaning. When a guest drinks water at dinner, his host says *Heneen*, as I well remember, and as Lane remarks ("Modern Egyptians," 1, p. 183), the meaning of which is, "may it profit you," or "may you digest." Here we find, on the old water pot made about 700 B.C., the same wish expressed, "to your digestion," or "health," but it is remarkable that I cannot find the root in Hebrew, but in Buxtooff's Chaldee Dictionary. This indicates an Aramaic rather than a Hebrew population in Lachish, and we must remember that in 700 B.C. the first transportation of Aramaic tribes into Palestine took place, with the fall of Samaria.

[1] *Quarterly Statement* p. 230, 1890.

IV.

The Lachish Pillar.

After inspecting the cast of this pillar it becomes more possible to obtain some idea of its date. The dressing is compared by Mr. Petrie to that of the masonry of Herod's Temple. Professor Hayter Lewis has noticed the same dressing on Carthaginian monuments, which are equally of late date, and it has recently been pointed out that the Greek sculptors used the same sort of tool, in finishing the less polished parts of their statues. As far, therefore, as the dressing is an indication, the pillar should belong to the Greek period in Palestine.

Mr. Petrie also compares this pillar to that found by Sir C. Warren west of Herod's Temple enclosure. The site where it was found is that where the Jews of the second century B.C. erected the Xystus, in imitation of Greek custom. The general style of the Palace of Hyrcanus, built in the same century east of Jordan, agrees also with this attribution.

Capitals have also been found in Cyprus, at Athieno, which present a close resemblance, in general idea, to that discovered by Mr. Petrie ; and this Cypriote style is accompanied, in at least one instance, by a text in Greek language and character.

These various considerations lead me to suppose that the Lachish capital is not older than 300 B.C., and belongs to the time when a rude art grew up in Syria and in Cyprus, based on Greek influence—an influence which was so strong as to lead to the revolt of Judas Maccabæus in whose time Greek manners, architecture, and even Greek rites, were adopted by the Jews. The text on the pot and the capital together, seem to indicate that at Lachish we have to deal with ruins extending from 700 to 200 B.C., and perhaps later. When the site is more fully explored we may discover yet older remains ; but alphabetic texts older than about 1,000 B.C. are hardly to be expected.

V.

Quotations of Psalms.

In reply to the question asked in the last *Quarterly Statement*, it may be noted that quotations from Psalms were very commonly placed on the walls of houses in Palestine in the fifth and sixth centuries B.C. Many are known in the Hauran and in Northern Syria. I discovered one in Southern Palestine. They are many centuries older than the earliest known MS. of the LXX. (*see* "Scottish Review," July, 1890).

VI.

The Khabiri or Abiri.

Professor Sayce informs me that German scholars were inclined at first to suppose that the Khabiri or Abiri were Hebrews, but abandoned the idea because the sign in Assyrian does not represent *'a*, but only the letters which in Arabic are ع and غ.

This objection does not, however, seem to be a strong one. As mentioned before, the name of Gaza עזה is spelt *Khazati* in the same letter. The distinction of ع and غ is not found in the early Semetic alphabets, both letters being represented by the same sign ע, although the same alphabets carefully distinguish צ from ס and שׁ, as also ק from כ, and ט from ת. We do not, perhaps, know the exact sound of the Hebrew name, which the Greeks rendered by Ἑβραῖος; but we know it was written with the letter ע, whatever may have been the exact sound given to that letter, and that it was therefore written with the same letter used in the name of Gaza.

In this connection it is to be observed that the Fellahin still confuse, in their dialect, the gutturals ح ع and غ; and it is very remarkable that the Phœnicians should not distinguish the ع and غ, even as late as 200 B.C.

It appears, therefore, that the objection is hypercritical, especially in dealing with a period as early as 1450 B.C. It has been suggested that the *Khabiri* were "Hittite" allied tribes, but this would conflict both with Biblical and also with monumental history. There were Hittites in Hebron in Abraham's time, according to Genesis; but their power was much shaken by Thothmes III in 1600 B.C., and in 1350 B.C. we only read of them in the north of Syria, where also they appear in the Tell Amarna texts. The conditions which prevailed in Palestine in 2000 B.C., did not, apparently, prevail 500 years later, after the first Egyptian conquest.

VII.

The Sculptured Tomb at Shefa 'Amr.

This tomb I measured in 1875. A view of the façade is given in "Tent Work" (Frontispiece, Vol. II), and an account in the "Memoirs" (I p. 340), where, however, I have only ventured to give those letters of the inscription which appear clearest. Herr Schumacher gives an imperfect sketch of the same (*Quarterly Statement*, October, 1889, p. 189), but does not mention the inscription In the "Memoirs" it is described as a Christian tomb.

I think there is little doubt that Mr. J. P. Van Kasteren ("Geboorteplaatz der Boanerges," Amsterdam, 1890), has correctly restored the text which agrees with my MS. copy, and is as follows :—

ΚΕΧΡΕΒ	... ΕΛΕ
ΟΗΘΙCΑΛ	ΗCΟΝ ΜΕ
	(ΚΑΙ) ΤΕΚΝ(ΟΝ)
LEFT OF DOOR.	RIGHT OF DOOR.

Κ(υρι)ε Χρ(ιστ)ε βοηθ(ε)ι Σαλ . . . Ελεησον με (και) τεκνον.

"Lord Christ, help Sal. . . . . Have mercy on me and on my offspring."

This agrees with the ascription of the tomb to Christian times, being the family tomb of a certain Sal. . . . (Saleh or Salmon), whose name is evidently that of a native of Palestine.

VIII.

Notes on the "Quarterly Statement."

P. 220. *'Amariu.*—Mr. Flinders Petrie connects this name (as did Professor Palmer) with the Amorites. But it is written with the Guttural ע while the Hebrew word is written with א. It only means, apparently, "Omar's tribe."

P. 221. *Modern Pottery.*—The fact (mentioned in the "Memoirs") of the black pottery being still made at Gaza shows—as do many others—how difficult it is to date pottery, as the old methods continue to survive even now.

P. 232. *Horns of the Altar.*—The account given by Maimonides should not be ignored. It does not agree with the new theory.

P. 242.—There seems no reason for regarding the Beit el Khulil masonry as Pre-Herodian. I have inspected the dressing several times, and it is much the same used by the Romans, 2nd to 6th century, A.D. The place, as described in the "Memoirs," was a market-place in the Christian age. The seats are still visible, and the remains of a chapel. This agrees with the date of the inscription, which I sought in vain, and which Mr. Flinders Petrie has at length found and attributed to 3rd century, A.D.

P. 245.—The tinkers whom he saw near Jaffa were no doubt gypsies. The Palestine gypsies are mentioned in "Tent Work in Palestine."

P. 332.—The reason why the Malula words resemble Hindi is clear. Hindi is a very mixed language, and contains a number of Arabic and Aramaic words which came into it through the Persian. Persian itself

is full of such words, as is also modern Turkish. But every word compared is a true Semitic word, and it would be vain to attempt to build a theory on this basis as to Hindi, which is a degraded mixture of several languages on an Aryan basis. The sounds of the Malula vowels are probably indefinite, like those of Fellah dialects, and to apply to them the rules of book Arabic would be hypercritical.

NOTES BY DR. SELAH MERRILL.

Pits in the Shittim Plain.

As public attention has recently been called anew to these singular remains, I will quote my original description of them from the "Fourth Statement of the Palestine Exploration Society," 1877, pp. 97–99 (*see* also "East of the Jordan," pp. 225–227).

"About one hour north of Wady Nimrin, there is a series of pits running in a straight line across the plain from east to west. This series meets another running from north-east to south-west, the line of which is not exactly straight. The pit where these two lines intersect is larger than any of the others. At the extreme eastern end of the longest line, and just behind the end pit, there is a single pit which is very curious on account of its position. Each pit is 30 feet in diameter and perfectly round; while at present the depth of the pits varies from 3 to 6 feet. The distance from one pit to another is in general about equal to the diameter, although in exceptional cases it is increased to 50 or 60 feet. There are 31 pits in the longest line, and 20 in the other. The line probably extended somewhat further towards the Jordan, but the pits in that direction have been obliterated in some way. . . . Further south, and near what is now the bank of Wady Nimrin, there are the remains of another series of pits of which I counted about a dozen."

In the *Quarterly Statement* for April, 1890, p. 130, Mr. Neil describes these pits "as three rows of basin-like circular mounds, about 5 or 6 feet high and some 30 feet in diameter. . . In the longest row there are no less than 31 of these hollow basins. They are generally 30 feet apart, but in some instances 50 to 60 feet."

I have read Mr. Neil's "Palestine Re-peopled" and "Palestine Explored," the only works of his accessible to me, and I find no mention

of these pits. He states that he "was on a journey to the highlands of Moab in 1873," and to have visited these pits must have gone far out of his way. It is remarkable that he should have carried in his memory for seventeen years details of these pits, which tally almost word for word with my own measurements.

Mr. Neil says, that within the edge or rim "the actual pits themselves once yawned deep and wide." Can this be true? If the basins are 4 feet in depth (for an average) and the edge is still perfect, where did the material come from that has filled them, for a considerable amount of earth would be required? Dust, rain, and the winter grass are the only means by which the pits could have been filled. Had the edges of the pits been washed for the required filling material, they would not be perfect in shape as they now are. Again, had there been piles of earth about the pits and this earth been washed in, the rims would not be in perfect shape. No, friend Niel, these pits never "yawned deep and wide." I doubt if they were ever much deeper than they are at present.

Were they used for irrigation, or were they connected in anyway with a water supply? This I doubt. They are 30 feet apart; while those on the Damascus Plain are said to be (p. 131) "50 or 60 yards apart." Moreover, they are close to Wady Nimrin, a large living stream. Canals to-day carry water south of the stream, and were water ever wanted north of it why would it not be carried thither in the same way? The cost of leading water by means of canals from this stream to the region where the pits are found, would be trifling compared with that of digging a large number of pits that "yawned deep and wide," to say nothing of the underground connecting tunnels.

At the time of my examination, my impression was that these pits were used for military purposes, and since then I have learned that similar pits are sometimes used in such a way.

Castle and Rock-cut Channel at Khan Minieh.

On p. 178, *Quarterly Statement*, July, 1890, Mr. Brass speaks of "exploring" near the Sea of Galilee, and the inference is that what he mentions immediately, *i.e.*, "the remains of a fortification," is *a new discovery*. But these remains have been familiar to Palestinian scholars for many years past, for upwards of thirty years at least.

Visits to M'Shita.

The reference by Mr. Hill, on p. 174, is probably to the exploration of the Dead Sea by Lieutenant Lynch. As a matter of history, I will state that we visited M'Shita twice (1875, 1876), and both times under the

escort of the Adwan. On the first of these visits we took several fine photographs, and on the second I brought away specimens of bricks, of which I noticed three different sizes.

Was Chosroes II ever in Palestine?

Many English writers refer to Chosroes (meaning Chosroes II) in such a way as to lead one to think that he was in Palestine. Such references are not of infrequent occurrence, and there are two in the July *Quarterly Statement*, pp. 173, 179. I shall be grateful to anyone who will indicate the work which contains the evidence that Chosroes II was ever in the Holy Land. My impression has been that he was never in that country, and that the Persian army was there but a very few years. To me it is very doubtful if Chosroes II, Shahr Barz, his greatest General, or any other Persian of that period had anything to do with the building of the M'Shita Palace.

Natural Bridge, Hot Spring, and Roman Road at Pella.

On p. 182, Conder states that "the Hot Bath of Pella" mentioned in the Jerusalem Talmud, "is evidently the springs at Tell Hamma." It is not clear what place he means by "Tell Hamma." Tell el Hammam is on the Shittim Plain. El Hamma is the name of the hot springs at Gadara on the Menadireh (Yarmuk). Thirty-five minutes from Tubakhat Fahl (Pella) I discovered a fine natural bridge, and beside it a hot spring. This is on Wady Hammet Abu Dhabbeh, and is the spring to which I suppose reference to be made in the Jerusalem Talmud. In "East of the Jordan" (Bentleys, London), p. 183, *et seq.*, will be found a sketch of both the bridge and hot spring.

The Roman road leading from Pella to Gerasa past Jabesh Gilead, I traced and made a sketch of the ground.

Inhabitants of Bashan.

On p. 188, Conder says that the inscriptions from the Hauran, "show that as late as the time of Agrippa I the inhabitants of Bashan were living in underground caves, and had not begun to build houses." This statement, nearly identical with that of Waddington, Inscriptions No. 2,329, appears to me to rest on a very slight basis. Of this Inscription (No. 2,322), De Vogüé has given a translation found in his Essay on the Hauran in the "Recovery of Jerusalem," p. 324. I will reproduce this translation, placing in brackets the parts which he has supplied: –

"[King Ag]rippa, friend of Cæsar, [and friend of the Ro]mans, says . . . of a life like that of wild beasts. . . I am ignorant how, up to the present time, [in many] parts of the [coun]try dwelling in caves . . . nor altogether."

In my judgment there is nothing here on which to base any statement respecting the inhabitants of that country, and I would not be so rash as to attempt to read history into these fragments of sentences. To me it is much more likely that the inscription refers to robbers. It is well known that Bashan has had its full share of periods of prosperity. Fourteen and a half centuries B.C. a single section of this country had "threescore cities, all of which were fenced with high walls, gates, and bars; besides unwalled towns a great many" (Deut. iii, 4, 5). Eight and a half centuries B.C., Shalmanezar II invaded Bashan and "pulled down their houses without number." Would a great Assyrian King with a powerful army have gone into this region to hunt out people who lived in caves? We have also the Nabathean and the Roman periods. My view has been that the Bashan country has from the remotest times been occupied by strong and wealthy people, that the building material was always of stone, and that in the case of Shalmanezar II *pulling down houses* implied *stone houses*. The statement quoted from Conder I regard as without historical foundation, and furthermore, as actually contrary to history.

PHŒNICIANS IN DEVONSHIRE.

By H. B. S. W.

The occurrence in various parts of Palestine of clusters of Dolmens, or Cromlechs, and the survival of a few examples of these erections in Devon and Cornwall, leads to the enquiry as to the identity of the race by which these stones were erected in such far distant places.

There has recently, however, been published in the "Western Morning News" an article entitled "Phœnicians in Dart Vale," a copy of which I append, which, as it appeals to the experience of the Palestine Exploration Committee, should, I think, be laid before readers of the *Quarterly Statement*.

I should certainly like to know whether such scholars as Professor Sayce, Dr. Ginsburg, Herr Khitrovo, Major Conder, &c., have really accepted the statements respecting the Ballhatchet of Ipplepen?

That the name is not confined to that locality I am quite certain; there is now, and has been for many years past, a family of that name resident in Plymouth.

What connection there may have been with those residing in the neighbourhood of the Dart in former times of course I do not know, but I never heard of the Plymouth family being noticeable for any peculiarity of their physiognomy :—

"PHŒNICIANS IN DART VALE.

"(SPECIAL).

"Much interest, not only local but world-wide, was aroused a few months back by the announcement of a Phœnician survival at Ipplepen, in the person of Mr. Thomas Ballhatchet, descendant of the priest of the Sun Temple there, and until lately owner of the plot of land called Baal ford, under Baal Tor, a priestly patrimony, which had come down to him through some 18 or 20 centuries, together with his name, and *his marked Levantine features* and characteristics.

"Such survivals are not infrequent among Orientals, as, for instance, the Cohens, Aaron's family, the Bengal Brahmins, the Rechabites, &c. Ballhatchet's sole peculiarity is his holding on to the land, in which, however, he is kept in countenance in England by the Purkises, who drew the body of Rufus to its grave in Winchester Cathedral on 2nd August, 1,100 and the Chertsey Wapshots, who had held their land, father to son, from the days of King Alfred, both families existing until within 40 years. *Widely spread as was the announcement, no Semitic scholar, of whatever rank, either challenged or contradicted it.* Many, indeed, accepted it frankly, while others considered it as 'fairly tenable.'

"Further quiet research makes it clear beyond all manner of doubt that the Phœnician tin colony, domiciled at Totnes, and whose sun temple was located on their eastern sky-line at Ippelepen, have left extensive traces of their presence all the way down the Dart in the identical and unaltered names of places, a test of which the *Palestine Exploration Committee* record the priceless value. To give but one instance :—The beautiful light-refracting diadem which makes Belliver the most striking of all her sister tors, received from the Semite its consecration as 'Baal-livyah,' Baal, crown of beauty or glory. The word itself occurs in Proverbs 1-9 and 4-9, and as both Septuagint and Vulgate so render it, it must have borne that meaning in the third century B.C. and in the third century A.D., and, of course, in the interval. There are many other instances quite as close, and any student of the new and fascinating science of Assyriology will continually add to them. A portrait of Ballhatchet, with some notes by an eminent and well-known Semitic scholar, may probably appear in the 'Graphic'; in the meantime it may be pointed out that his name is typically Babylonian. Not only is there at Pantellaria the gravestone of one Baal-yachi (Baal's beloved), but no less than three clay tablets from the Sun Temple of Sippara (the Bible Sepharvaim) bear the names of Baal-achi-iddin, Baal-achi-utsur, and Baal-achi-irriba. This last, which bears date 22 Sivan (in the 11th year of Nabonidus, B.C. 540), just two years before the catastrophe which followed on Belshazzar's feast, is in the possession of Mr. W. G. Thorpe, F.S.A. It is in beautiful condition, and records a loan by one Dinkiya to Baal-achi-irriba (Baal will protect his brother), on the security of some slaves."

ACOUSTICS AT MOUNTS EBAL AND GERIZIM.

From Wm. C. Winslow, D.D., LL.D., D.C.L., Vice-President for the United States of the Egypt Exploration Fund.

The recent cablegram to a Boston (U.S.A.), daily journal of "A Singular Experiment" that a party at Mounts Gerizim and Ebal in Palestine had successfully tested the ability to hear the blessings and curses proclaimed at that spot or site (*see* Deut. xxvii, and Josh. viii), is interesting as another bit of essential confirmation of the narratives of the Penteteuch and other biblical history; but the experiment is not a "singular" one, having been previously made, I am certain, and at all events by myself, in 1880, while engaged in scientific and archæological work in the Holy Land. On a perfectly clear and windless day in spring (like our late May) I stationed two persons on Mount Ebal, myself and an attendant on Mount Gerizim, and several persons in the valley between the mountains. We who read were some 700 feet above our little audience. We had arranged visual signals to indicate when one party was to begin and end in reading, lest the other party should not know when to "take up the tale," or even the audience when to say the amens. But no signal was needed. Not only did the audience hear our words distinctly and we their amens, but each speaker heard the words of the other speaker shot across a distance of nearly half a mile. We pronounced the blessings and the curses with Websterian deliberation, on, however, a high key, and not with a Phillips Brooks-like rapidity of utterance.

In all probability Joshua delivered the sentences midway between the two mountains, and the Levites re-echoed them for some distance up and down the valley, so that from the mountain sides on either hand the million or two of hearers intelligently replied with their amens. Jotham, we remember, used Gerizim as a pulpit from which to speak his parable to the Shechemites. With the hills for a sounding-board the spot is wonderfully acoustic. The sense of hearing in Joshua's day was particularly acute, as the Israelites were accustomed to listen to out-door services and sermons. Nor does the record state literally that every man, woman, and child heard the words, but that Joshua read the words before them.

Boston, *November* 2, 1890.

GIHON.

By Rev. W. F. Birch.

Dr. Chaplin's two papers in *Quarterly Statement*, 1890 (pp. 124, 331) touch on five points that require notice.

1. He is inclined to attribute "the short side tunnel and Warren's shaft" (i.e. my gutter) to Hezekiah, and refers 2 Chron. xxxii, 30, to this work.

2. While he is disposed to attribute the Siloam tunnel also to Hezekiah, he objects to its having been made "in haste."

3. He would derive the name Gihon from the word "*gahan*, to bow down," implying the crouching or grovelling position of one passing through the low passage of the Siloam tunnel.

4. He takes the mention of Gihon in 1 Kings i, 33–45, to be a prolepsis such as is repeatedly met with in the Old Testament.

I am always glad to see objections urged against my "gutter and Araunah" theory, though love for the truth brings me the trouble of exposing their hollowness.

1. Dr. Chaplin's first point, if true, would entirely sweep away my theory, for if Hezekiah made my so-called gutter, Joab could not have got up through it 300 years previously. Captain Warren (1885-64) considered that the short tunnel was *older* than that to Siloam; while Dr. Chaplin practically admits in (1) that the hill (Ophel) above Gihon (Virgin's Fount) was the site of the city of David. Now we have been repeatedly assured (1885, 107; 1887, 106) that this Ophel site is naturally so weak that it never could have been occupied by the stronghold of Zion. Yet the hard fact remains (as I have often shown) that it was actually so occupied. Accordingly, once again I ask, without any expectation of an answer, "What in the world ever led the Jebusites to make their fortress on Ophel, but the insuperable fact that by means of the gutter they would have an inexhaustible supply of water"? This obviously was the only secret of their 400 years' successful resistance, without chariots, and in the mountains. More fortunate than Zion, my theory need not fear any treacherous Araurah.

2. The fact that the tunnel was made from both ends at once, and the unfinished state at the point of junction seems to me to show that it was made "in haste," though I do not say in a short time.

Major Conder (1882, 128) says: "The two narrowest parts of the tunnel occur, one on either side of the point of junction. In fact, the excavators must be accused of scamping their work with the object of showing a greater total length than their rivals, and for this purpose they reduced the size of the excavation to a minimum in which it seems almost impossible that a man could have worked."

Of course it is possible that the excavators at the head of the tunnel

all along made it of the least width practicable, and that it was widened by others working in the rear. The above, however, is evidence enough of "haste."

3. Let it be assumed that Gihon is derived from *gahan*. Then, until the depth of the silt at the lowest parts of the Siloam tunnel has been ascertained, there is nothing to show that "bowing down" was originally more required in the Siloam tunnel than in "my gutter." As, therefore, the latter existed in David's time, so equally might the name of Gihon; and a prolepsis would be utterly unnecessary.

4. But let it be further assumed that no "bowing down" was required in my westward gutter, although Sir C. Warren stated (letters 25) that in clearing out the passage the men seldom had "much more than their heads above water." then I must expose the error in (4) above.

I stated (1890, 200) that "it would be *most unsatisfactory* to have to take 1 Kings i, 33, 45, as speaking proleptically, when Gihon is named by David and Jonathan." In reply to Dr. Chaplin (p. 331) let me point out that his examples (Bethel and Ebenezer) do not meet the case. Gihon is mentioned thrice in 1 Kings i. Now, if I had quoted v. 38, where *the historian* simply records an action, these examples would clearly have proved that I was wrong; for it is certain that the Bible narrative often anticipates the name by which places were called, *e.g.*, Dan is mentioned in Gen. and Deut., before Israel crossed the Jordan, though the name was given after the crossing (Josh. xix, 47).

Accordingly, I did not refer to v. 38, but cited only 33, 45, where *David* and *Jonathan* speak, and not the historian. This alters the whole case. I shall be obliged to any one who will produce satisfactory instances from the Old Testament in which *old* speakers are really made to speak in *new* terms. The Bible contains many explanatory additions, but I cannot find an instance (that will bear investigation) of the *substitution* of one word for another, such as would support Dr. Chaplin's (331) treatment of Gihon as *proleptical*.

The following, no doubt, satisfy some, but not me :—

(*a*) Gen. xl, 15. "I was stolen away out of the land of the Hebrews." A writer in the *Guardian*, p. 721, asks: "How could Joseph be made to speak of *the land of the Hebrews* by any author before that settlement?" Patrick explained the difficulty 200 years ago. The patriarchs, though living in tents, overcame kings, made treaties, dug wells, and gained fame. Nomads still give their names to the districts they frequent, and did so of old. The land of the Hebrews meant the land frequented by Abraham, Isaac, and Jacob.

(*b*) 1 Kings xiii, 32. "The saying shall surely come to pass against all the houses of *the high places which are in Samaria*." These are *apparently* the words of the old prophet uttered years before Samaria was built. This, I admit, *seems* a strong instance, and the *Bible Comment.* observes: "The writer of Kings has substituted for the term used by him that whereby the country was known in his own day."

It seems vain for me to object to this explanation without producing a better. The reader, after noting that in v. 2 the expression is simply "high places," may suspend judgment until a third instance has been examined.

(*c*) Judg. xxi, 19, R.V. "A feast of the Lord from year to year in Shiloh, which is on the north of Bethel, on the east side of the highway that goeth up from Bethel to Shechem and on the south of Lebonah." These, again, are *apparently* the words of the elders to the Benjamites. Now, the land of Benjamin reached to within ten miles of Shiloh. It would, therefore, be superfluous to describe so minutely to the latter the position of Shiloh. The difficulty is met in the A. V. by the insertion of the words *in a place* before *which*. This, however, is inadmissible. Obviously the details about the position of Shiloh are an *explanatory addition* appended when the glory of Shiloh was over and its very site in danger of being forgotten. The words, "which is on," &c., were *not* spoken by the elders, and similarly in (*b*) the words, "which are in Samaria," are a later explanatory addition, and were *not* actually spoken by the old prophet at all, so that (*b*) is *not* an instance of substitution. If any critic, by producing sound instances, can drive me from this position, let him do so. I shall cheerfully retire on the one point in question—"that it is *most unsatisfactory* to have to take 1 Kings i, 33, 45 as speaking proleptically when Gihon is named by David and Jonathan." I state this deliberately, because, curiously enough, in 41, 45, Joab and Jonathan apply to Jerusalem (or rather, I believe, to a particular part of it, *i.e.*, the city of David) the "almost solely poetical" term *Kiriah*, whilst this term is never elsewhere in the historical books so applied, except by the Samaritans and in the Persian decree in Ezra iv.

In Ps. xlviii, 2, *Kiriah* is used of the *city* of the great King, *i.e.*, the city of David (1888, 44), and in Is. xxix, 1, of "Ariel, the *city* where David encamped."

If, therefore, the prose writer has substituted Gihon for the actual name used by David and Jonathan, why has he not also substituted the ordinary word *Ir* or *Ar* (city) for the unusual word *Kiriah* used by Joab and Jonathan in the same passage?

Probably this question needs no answer, since it seems to me most likely that the short tunnel is quite as low as the Siloam one, and, therefore, on the assumption that Gihon came from *gahan*, the name may have been in use in David's time quite as easily as in Hezekiah's.

November 6th, 1890.

NOTES BY MRS. FINN, M.R.A.S.

I.

The Dead Sea Visible from Jerusalem.

During the last four years of our residence in Jerusalem we lived in the Consulate house, at the north-west corner of Jerusalem, at the highest point by the "Goliath Tower," El Jalûd. From the upper windows we had a fine view of the Dead Sea, backed by the Moab Mountains, on the west of which the walls and towers of Kerek were distinctly visible. In certain lights the sky was reflected from the Dead Sea, as from a looking glass. At other times the reflection of the Moab cliffs in the water was so perfect that it was difficult to make out the water. Josephus probably refers to the Dead Sea as visible from Psephinus—at this same north-west side of Jerusalem. I also have seen the Dead Sea from the roof of Christ Church.

II.

Araunah the Jebusite.

The quotation from 2 Sam. xxiv, 23, on p. 198 of the July *Quarterly* should read—"All these did Araunah *the* king הַמֶּלֶךְ (not *a* king) give unto the king." Araunah was "the king."

The word "Tyropean" on the same and other pages should, of course, be Tyropœon.

ON THE SITE OF THE HOLY SEPULCHRE.

By Henry Gillman, Esq, U.S. Consul, Jerusalem.

I have seen, from time to time, lately, statements to the effect that all recent discoveries have tended to establish the accuracy of the traditional site of the Holy Sepulchre. Nothing can be more contrary to the truth. The recently discovered Roman pavements, in connection with those uncovered two years ago or more, establish the position of Damascus gate as occupying an ancient site; and the discoveries in general all point to outside the gate as the place of crucifixion.

STONE MASK FROM ER-RAM.

Dr. Chaplin's stone mask from Er-Râm is curious. I have seen several of somewhat similar make, but of pottery, found near Um-rît, in Northern Syria, one, I think, representing a bearded head, is in the Ashmolean Museum at Oxford. I have been disposed to regard these objects as Græco-Phœnician, and as being, perhaps, of votive character.

Greville J. Chester.

BIBLIOTHECA GEOGRAPHICA PALÆSTINÆ.

By Professor Dr. Reinhold Röhricht. 1890.

Every student of the geography of Palestine must feel grateful to Prof. Röhricht for undertaking the very laborious task of compiling a bibliography and cartography of Palestine; and to the Berlin Geographical Society and Russian Palestine Society for enabling him to publish the result of his labours.

The Bibliography contains a reference to all works of any value on the geography and topography of Palestine from the fourth century to the present day; and to important articles in periodicals on the same subject. There are no less than 3,515 entries, representing as many different travellers or authors; and the catalogue of the MSS., translations, and printed editions of their works, and of the articles connected with them, occupies 597 closely printed pages.

It is interesting to notice the extraordinary growth of Palestine literature during the present century, and especially since Dr. Robinson first commenced a systematic examination of the geography of the Holy Land. Thus, for the 16th century there are 321 entries; for the 17th, 401; for the 18th, 318; for the 19th, 1,920, of which 1,629 are later than Dr. Robinson's first visit to Palestine in 1838.

The system adopted by Prof. Röhricht is to give in each case (1) a reference to all known MSS. of the work; (2) the titles of all printed editions; (3) a reference to translations; and (4) references to articles in magazines and newspapers which relate to the author or his subject.

The Bibliography has been prepared with great care; but, as is only natural in a work of such magnitude, there are many typographical errors. These are more numerous in the English references than in those in other languages, and it is much to be regretted that Prof. Röhricht did not get some Englishman acquainted with Palestine literature to revise

his proofs. These are, however, minor blemishes, and do not detract from the great value of the work as a whole.

The *Cartography* is the first real attempt that has been made to prepare a list of the maps and plans of Palestine, and, as such, though it is far from complete, it is of great interest and value.

Prof. Röhricht's book is not one for the general reader, but every one who wishes to study the geography and topography of the Holy Land, and to consult the original authorities, will find it invaluable as a work of reference.

It is very important that the bibliography of Palestine should be kept up to date. Articles of great interest appear from time to time in the monthly magazines, in the "Athenæum," in the "Academy," and in the daily papers, which, after the lapse of a few years, become difficult to trace when reference is necessary or desirable. I hope that, in future, it may be found possible to devote a page of each *Quarterly Statement* to the Palestine literature of the preceding Quarter. This should give the full titles of all published works, and references to all articles, published correspondence, &c., that have appeared in magazines or newspapers. The labour would not be great if subscribers sent a note of articles they have seen to the Secretary once a quarter. This Quarterly Bibliography would in time become extremely valuable, and it would greatly help Prof. Röhricht should he ever bring out a second edition of his great work.

C. W. W.